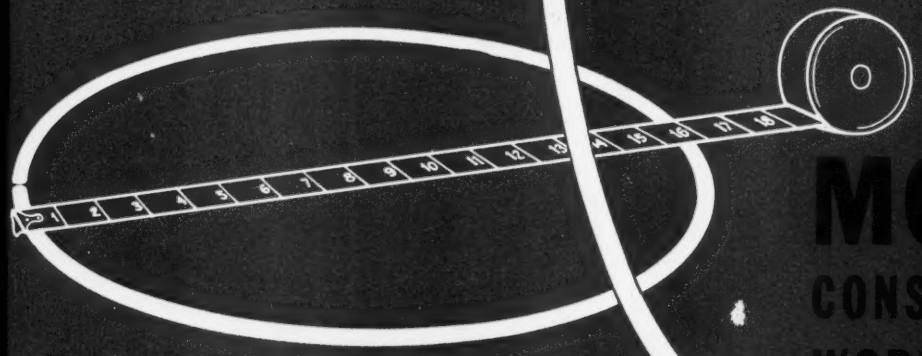
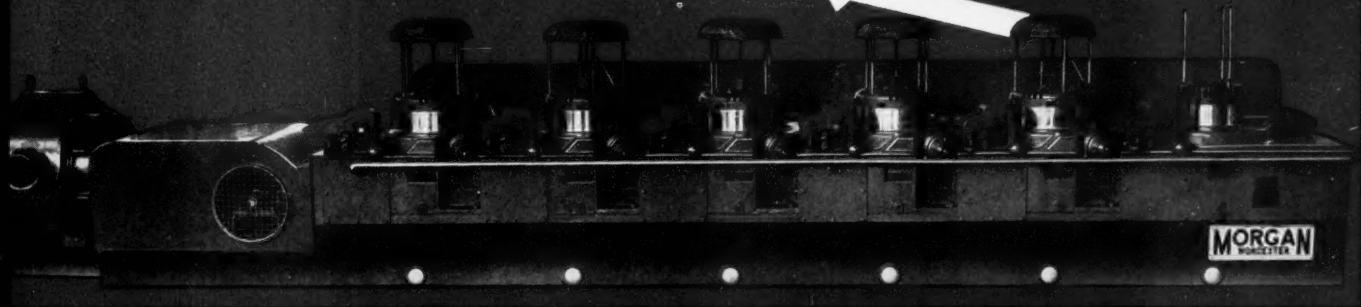
# WIRE AND WIRE PRODUCTS

AUGUST 1951

The Die Boxes are fully adjustable for CASTING

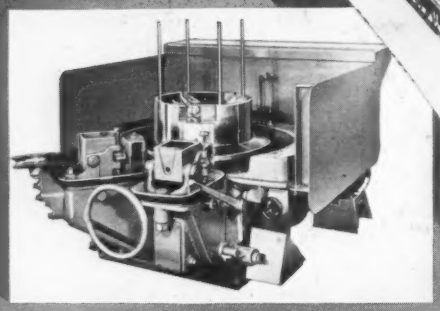


MORGAN
CONSTRUCTION CO.
WORCESTER, MASS.

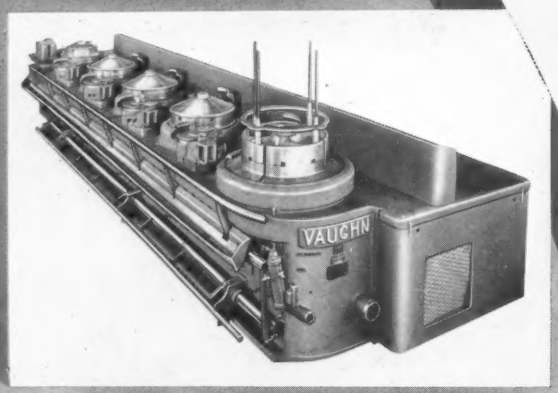



OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

# Vaughn MACHINERY



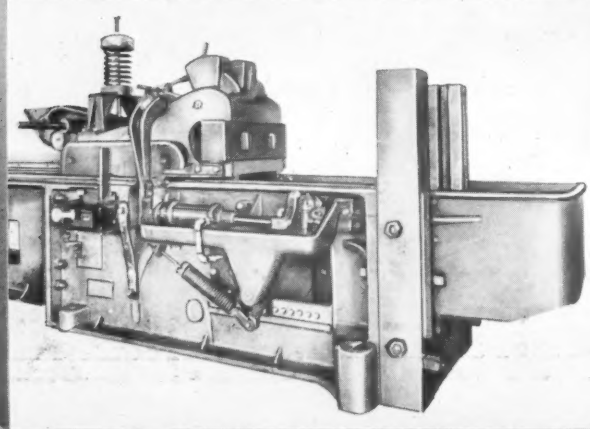
## TANKS, SHIPS, PLANES *for Victory*
## . . . HELD TOGETHER BY *WIRE!*

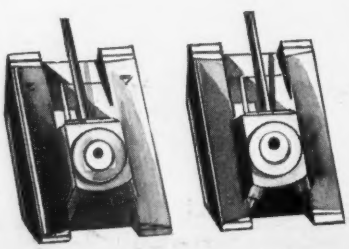


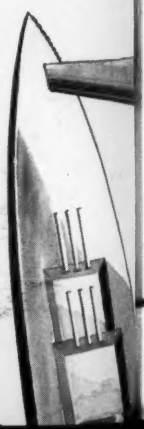

Yes, wire—in enormous quantities—binds these machines together. Wire for control and communication—for conveyors and cable—and for rivets, welding rod, nails and scores of other items. A very substantial tonnage of this fighting wire, of all kinds and all metals, is produced on VAUGHN Equipment.

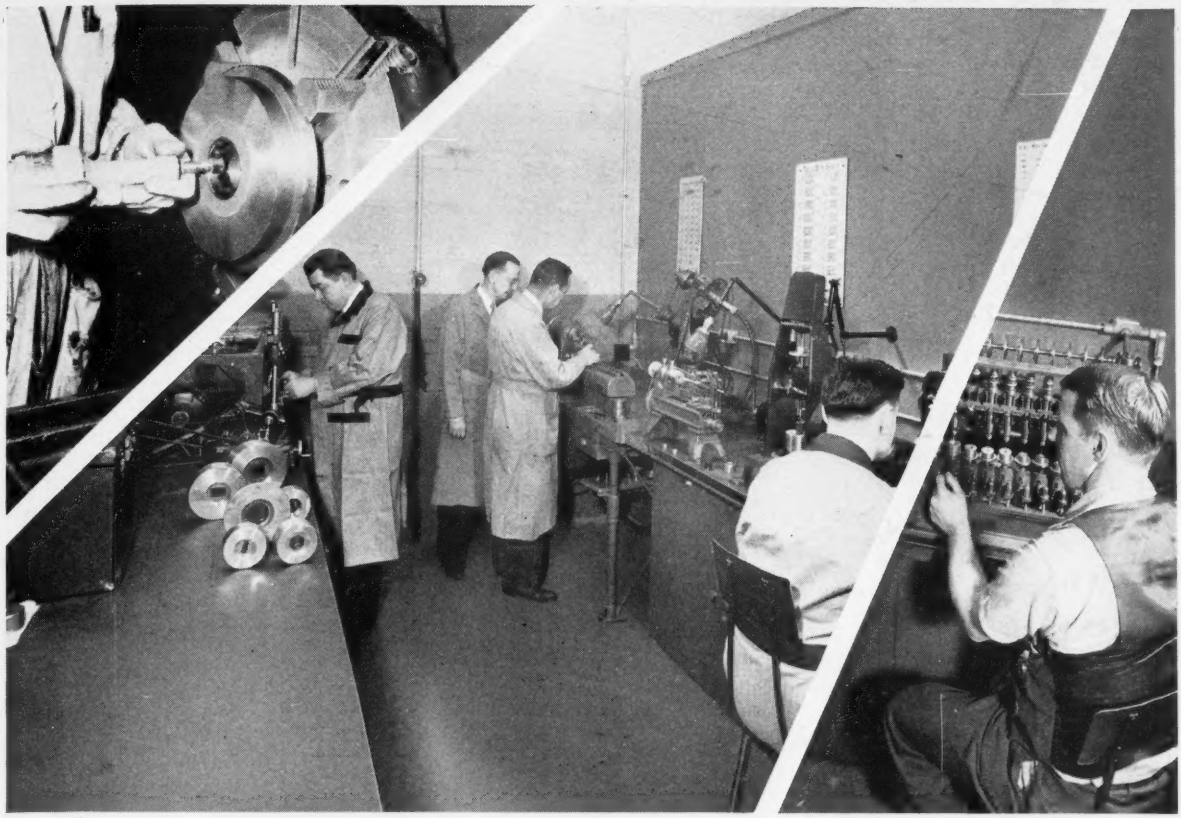
**THE VAUGHN MACHINERY COMPANY**
CUYAHOGA FALLS, OHIO, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT
Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.









# A Further Service To Help You Train Your Die Room Personnel

● To supplement the carbide die training service carried on for many years through our field representatives, we have recently established a special Training Course, conducted at our Detroit plant, for the benefit of cemented carbide die and mandrel users.

The purpose of this course is to make available to die users in war industries, a training course covering all phases of carbide die and mandrel finishing and servicing. It is intended primarily for your die room supervision so that they in turn may extend this training to the operators in your die room. A total of nine subjects are available for selection. These cover the finishing and servicing of small, medium-sized, and large round hole dies, square, hexagon and special shape dies, small and large cartridge case dies, and tube drawing mandrels. Die room layout and control is also included. One or more subjects may be selected. All operations are covered by actual shop work—not merely lectures.

The courses are offered without charge as a further service to industries engaged in war production. Special booklet (D-115) containing complete information sent on request.

**CARBOLOY COMPANY, INC., DETROIT, MICH.**

TRADEMARK

*Sole makers of the Carboloy brand of cemented carbides*

TRADEMARK

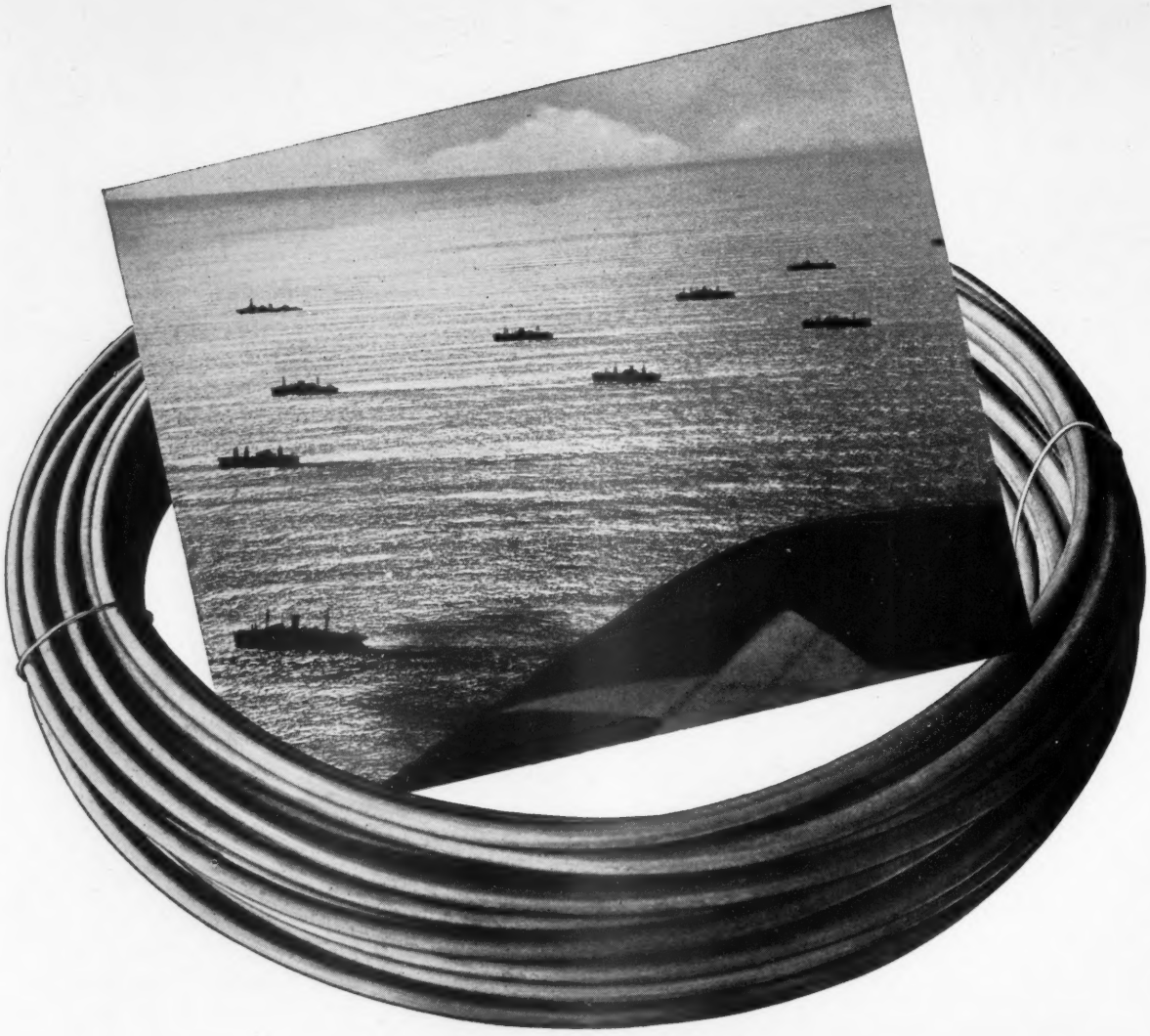
Birmingham, Ala. • Chicago • Cleveland • Los Angeles • Newark • Philadelphia • Pittsburgh • Seattle

*Authorized Distributors:* Canadian General Electric Co., Ltd., Toronto, Canada; Hartley Wire Die Co., Thomaston, Conn., Michigan Wire Die Co., Detroit, Mich.

*Foreign Distributor:* International General Electric Co., Schenectady, N.Y.

**CARBOLOY** TRADEMARK **CEMENTED CARBIDES** TRADEMARK

**COMPLETE DIE SERVICE FOR WIRE, BAR, TUBING AND SHEET METAL**



# Convoy builder

This coil of Bethlehem welding wire may not make the headlines along with those efficient U-boat killers, the destroyer-escort and the corvette. But it is one of the basic reasons why America is finally going to win the battle of supply—the basic struggle upon which our war efforts on all fronts depend.

Everybody who reads the papers knows that American shipbuilders are producing all kinds of ships at unheard-of speed. This is effected largely by use of subassemblies and new welding techniques, opening up undreamt-of possibilities in the rapid assembling of ships to supply our fighting fronts.

Every month, Bethlehem Steel Company is producing many thousands of tons of welding-quality wire and rods in coils. Processors are turning these products into the finished electrodes which are helping the nation's humming shipyards in their swift building of cargo carriers, as well as warships of every type.

★ ★ ★ BETHLEHEM STEEL ★ ★ ★

# CLEAN LEAD = *better sheath!*

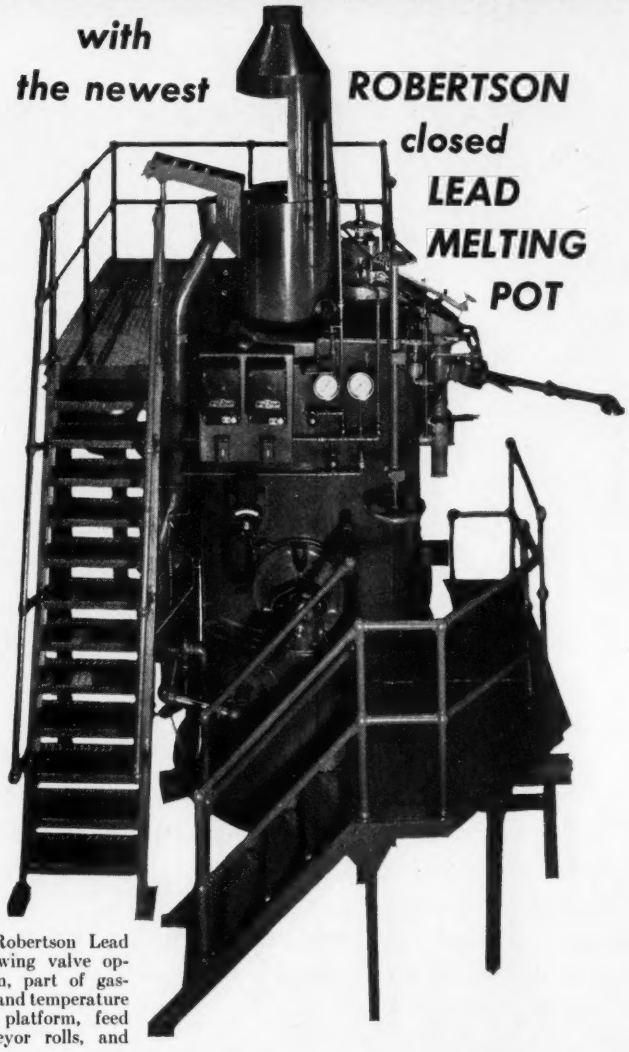
**with the newest ROBERTSON closed LEAD MELTING POT**

IN THE Robertson Closed Lead Melting Pot, $CO_2$ gas is used to keep down the formation of oxides over the lead, both in the melting pot and during the process of filling the extrusion cylinder with lead.

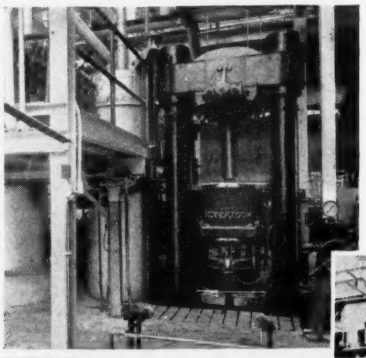
The filling tube serves as a melting chamber and the main body of the pot, which serves for storage, holds the molten lead relatively free from agitation in a neutral atmosphere of $CO_2$ gas.

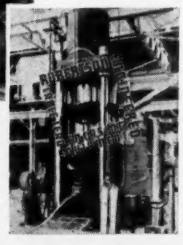
Oxide and dirt from the pig lead float to the top and are skimmed off. Only *clean lead* is drawn from storage to extrusion cylinder, and it is *kept clean* in transit by a protecting blanket of $CO_2$ gas.

Experience has shown this method greatly reduces inclusions, and the principle, as employed by Robertson engineering and construction, assures quality sheath.



*At right, above:* Robertson Lead Melting Pot, showing valve operating mechanism, part of gas-burner equipment and temperature controls, loading platform, feed chute with conveyor rolls, and operating platform.





**NEARLY ALL** producers of lead encased cable in the U.S.A. and Canada use Robertson Cable Lead Encasing Equipment—complete with lead melting pots, presses, operating valves, "quick-change" die-blocks, and hydraulic pumps. Ask about this equipment; write for free copy of bulletin which describes all these machines. No obligation.

**JOHN ROBERTSON CO., INC., 125-137 Water St., Brooklyn 1, N. Y.**

# ROBERTSON

***Established 1858*** **• Designers and builders of Lead Encasing Machines and Hydraulic Equipment, Including Extrusion Presses, Hydraulic Pumps, Melting Furnaces and Pots, Dies and Cores, Hydro-Pneumatic Accumulators, Lead Sheath Stripping Machines, and Special Equipment for Special Uses.**

TO GET THE ULTIMATE

*Use*

Vascoloy RAMET

T M. REG .U S. PAT. OFF

# TANTALUM-TUNGSTEN CARBIDE DIES

| | |
|---|---|
| **FOR DRAWING** | For drawing fine wire, heavy wire, special shapes, tubing, etc. For shell and cartridge cases from the blank to completed case. |
| **FOR COLD HEADING** | Rivets and any number of small upset parts required in large quantities to close tolerance. |
| **FOR COLD NOSING** | Artillery shells. |
| **FOR EXTRUDING** | For extruding operations on a wide variety of parts because of quantity and tolerance requirements. |

**MORE PRODUCTION, BETTER FINISH, AND CLOSER TOLERANCE**—these characterize the high performance of Vascoloy-Ramet Tantalum-Tungsten Carbide Dies. All these factors contribute to getting the ultimate with drawing, cold heading, and extruding dies.

**TANTALUM-TUNGSTEN CARBIDE DIES** are now used for countless forming, nosing, drawing, cupping and extruding operations on articles of war materiel. Our special die department offers its services and experience to manufacturers making products requiring these operations.

If carbide dies can be used to advantage, we will design and produce Tantalum-Tungsten Carbide Dies that will assure you the ultimate in performance.

437

*Ramet*

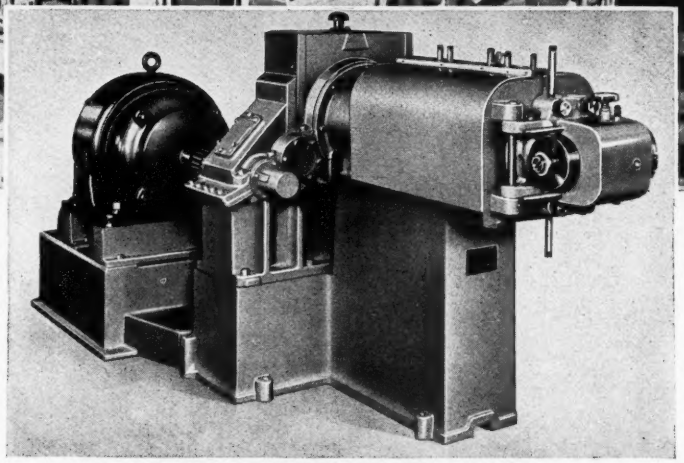
**VASCOLOY-RAMET CORPORATION**

NORTH CHICAGO, ILLINOIS • DISTRICT SALES AND SERVICE IN PRINCIPAL CITIES • IN CANADA: CARBIDE TOOL & DIE CO., LTD., HAMILTON, ONT.

TANTALUM-TUNGSTEN CARBIDE

**FOR HIGH PERFORMANCE • • • *Specify* Vascoloy RAMET DIES**

In Algiers, capital of Algeria, North Africa, where the soldier met the Royle Extruder.



This modern Royle Wire Covering machine is one of the types on which much of the wire used by American troops in North Africa was processed.

# HE MET A ROYLE EXTRUDER IN NORTH AFRICA

"I'm in North Africa" the young soldier wrote Mr. Day, our English representative, "and am beginning to be home-sick. I met what is almost an old friend last week — a Royle Extruder in a French machine shop. For fourteen days running I ate my meals off it".

To which Mr. Day added in his letter telling us the story: "You see, not only do sailors and soldiers get around, but evidently so do Royle Extruders".

ARMY E NAVY

*Let's Work and Fight for the Free America We Love*

# JOHN ROYLE & SONS

PATERSON 3 NEW JERSEY

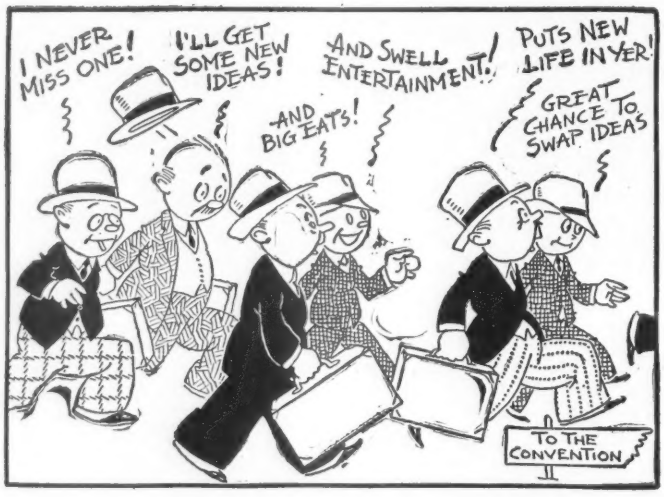
**PIONEER BUILDERS OF RUBBER AND PLASTICS EXTRUDERS**

ROYLE PATERSON N.J.

**AKRON, OHIO**
*Represented by* **J. C. CLINEFELTER**
**UNIVERSITY 3726**

**LONDON, ENG.**
*Represented by* **JAMES DAY (MACHINERY) LTD.**

# The Wartime Emergency Annual Convention 1943


I NEVER MISS ONE!
I'LL GET SOME NEW IDEAS!
AND SWELL ENTERTAINMENT!
PUTS NEW LIFE IN YER!
AND BIG EATS!
GREAT CHANCE TO SWAP IDEAS
TO THE CONVENTION

In the Windy City
We'll foregather soon
Our Convention to hold
Starting Monday, high noon.

The month is October
Eighteenth is the day;
You must plan to join us
For work and some play.

Remember your friends,
The old and the new,
They'll be looking again
There to see you.

The Program Committee,
In serious mood,
Has chosen some subjects
That are timely and good.

Unusual interest
For wire men all
Will be found in the papers
To be given this Fall.

Synthetics and plastics,
Rods, wire and springs,
Come up for a hearing
With many more things.

The latest processes,
In metals, what's new;
To speed your production
Is the object in view.

And topping the features —
He'll give it his all —
The Mordica mantle
On Flint Elder did fall.

***So call in your steno —***
***Reserve rooms or suites —***
***We hope there to see you***
***When the first session meets.***

## The Wartime Emergency Annual Convention

of

## The Wire Association

LaSalle Hotel, October 18-22, 1943
Chicago, Illinois

# PROGRAM

## Wire Association Wartime Emergency Convention

Chicago, Illinois, October 18-22, 1943. Association Headquarters--Hotel LaSalle

— TECHNICAL PAPERS —
WILL BE PRESENTED RELATING TO

Navy Material Inspection Methods
Designing Mills for Government Purposes
Labor Relationships
Plating of Steel Wire
Steel Wire Drawing Practices
Coating Steel Wire with Lead as a Substitute for Zinc
Work Simplification

NON-FERROUS — INSULATED WIRE & CABLE

Drawing of Fibres
Vinyl Resin Finishes
Glass Insulation—Its Use and Properties
Application of Synthetic Compounds to Wire by Extrusion

THE MORDICA MEMORIAL LECTURE
To Be Presented By
Flint C. Elder, Director of Research,
American Steel & Wire Company, Cleveland, Ohio

★ SPECIAL FEATURES ★

WIRE ASSOCIATION ANNUAL LUNCHEON — HOTEL LA SALLE
ANNUAL DINNER — STAG SMOKER — THE HOTEL LA SALLE
AMERICAN SOCIETY FOR METALS DINNER
ANNUAL MEETING OF THE WIRE ASSOCIATION

### PROGRAM COMMITTEE

General Chairman
A. M. Reeder, Metallurgical Engineer,
Jones & Laughlin Steel Corporation,
Pittsburgh, Penna.

Chairman Non-Ferrous Division
E. W. Gundstrom, Assistant Plant Mgr.
Rome Cable Corporation,
Rome, New York

J. A. Bryson, Metallurgist,
Burgess Parr Company,
Geneva, Illinois

F. M. Crapo, President,
Indiana Steel & Wire Company,
Muncie, Indiana

John C. Coppick, Mill Supt.,
Canadian Steel Corp., Ltd.,
Ojibway, Ontario, Canada

L. E. Kinn, President,
Seneca Wire & Mfg. Company,
Fostoria, Ohio

L. F. Buckman, Plant Manager,
General Cable Corporation,
Pawtucket, Rhode Island

C. A. Litzler, Chief Engineer,
Industrial Oven Engineering Co.,
Cleveland, Ohio

LOCAL ACTIVITIES
E. J. Hubbard, Jr., Vice President,
Hubbard Spool Co., Chicago, Ill.

R. E. Brown, Editor and Publisher,
WIRE & WIRE PRODUCTS,
Stamford, Conn.

SMOKER ACTIVITIES
A. R. Zapp, Manager, Firthaloy Div.,
Firth-Sterling Steel Co., McKeesport, Penna.

**Hotel reservations may be made by members of The Wire Association direct with the Hotel LaSalle prior to October 10, 1943. *Watch out for this—Make your plans now to attend and send your reservation card in promptly.***

Solid rounds of alloy steel for 75mm. gun-barrels are pierced on a pipe mill by J & L skilled workmen.

COPYRIGHT 1943 — JONES & LAUGHLIN STEEL CORPORATION

FROM AN ORIGINAL DRAWING BY ORISON MACPHERSON

# NEW PRODUCTION TEAM DELIVERS THE GUNS FOR VICTORY

The new 75mm. gun, descendant of the famous French 75 of World War I, is winning victorious acclaim in this war for and by our armed forces. This powerful weapon is one of the keystones in the teamwork our armed forces are employing on the fighting front to defeat the enemy.

Likewise on the industrial front it is teamwork that is producing these 75mm. gun-barrels at a fighting pace. The steel comes from a leading alloy steel manufacturer in the form of solid rounds eight feet long. At the Jones & Laughlin seamless tube mills, where oil country pipe is normally produced, these alloy steel rounds are heated and pierced their full length. Next steps are upsetting (forging) the breech end and heat-treating by a famous bearing manufacturer. Final stage is the machining and rifling by a New England machine tool company.

Four steps — four companies — each doing for Victory the thing best suited to its experience, skill and equipment. This is another example of war cooperation taking the place of competition in industry . . . of teamwork on the production fronts that matches the teamwork on the fighting fronts among our armed forces and those of our allies.

PITTSBURGH WORKS

ARMY E NAVY

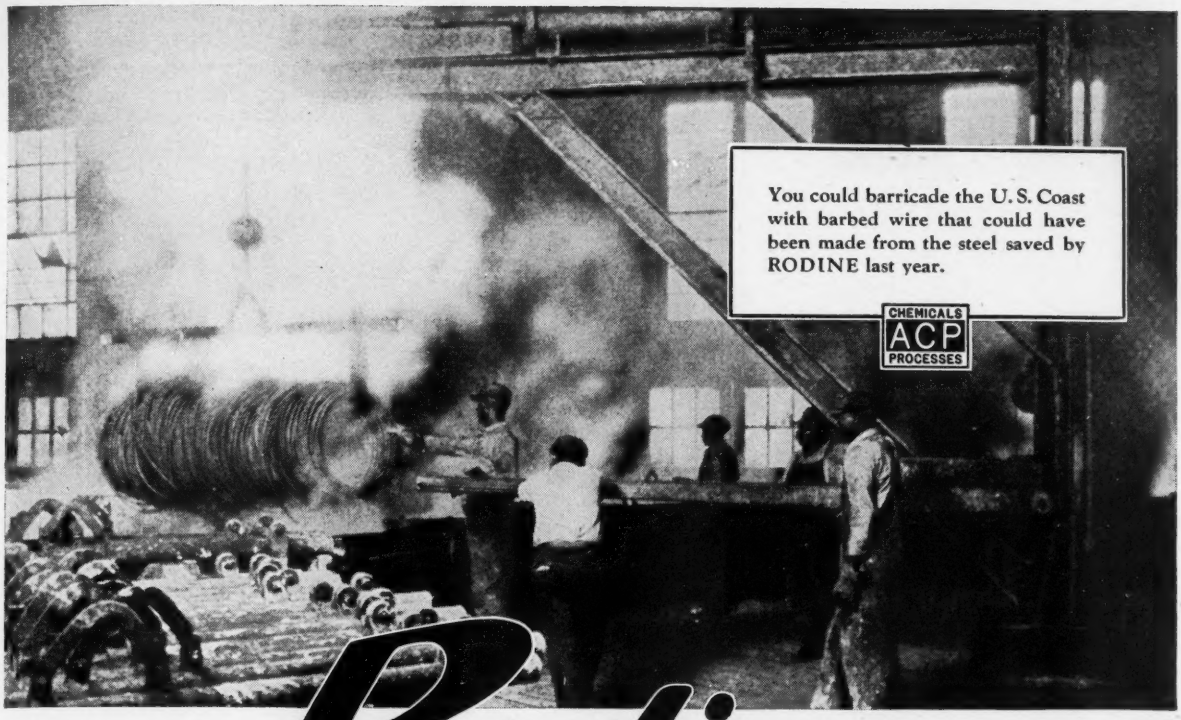
ALIQUIPPA WORKS

**JONES & LAUGHLIN STEEL CORPORATION**

PITTSBURGH, PENNSYLVANIA

CONTROLLED QUALITY STEEL FOR WAR

J&L STEEL


You could barricade the U. S. Coast with barbed wire that could have been made from the steel saved by RODINE last year.
CHEMICALS
ACP
PROCESSES

# Rodine

## YOUR SAFETY FACTOR

### *Speed up Pickling to Meet War Schedules Without Danger of Over Pickling*

The RODINE controlled acid bath enables you to clean more metal in less time and eliminates spoilage from over pickling even though your labor is uncertain during this manpower shortage.

RODINE is an *inhibitor* which effectually controls the acid in the pickling bath confining its action to removing the mill scale or rust, and preventing its attack on clean metal. RODINE is not new—it has revolutionized the methods of pickling steel all over the world.

**Outstanding Advantages of RODINE:**

**Metal is not wasted in pickling**
**Acid is not wasted dissolving good metal**
**The Metal is not pitted or "burned"**
**Over pickling is eliminated**
**Pickled surfaces are bright and clean**
**Acid brittleness is minimized**
**The atmosphere is not contaminated with noxious gases**
**Corrosion of steel-work in pickling house is reduced**

•

**CUPRODINE** *Saves Wear on Dies*

War Production has created a tremendous demand for dies which are hard to obtain and costly to produce. Cuprodizing has done much to ease this serious bottleneck in metal fabrication by increasing the life of dies from five to ten fold.

There are various types of RODINE to meet different requirements in operation. The ACP engineers will recommend the proper grade for your particular use. They will also be glad to cooperate in solution of any problems concerning cleaning or finishing of metal.

*Manufacturers of Inhibitors & Metal Working Chemicals*

**AMERICAN CHEMICAL PAINT CO.**
**AMBLER** ACP **PENNA.**

*Note: West Coast Plants may address inquiries and orders for prompt delivery to, Leon Finch, Ltd., 728 East 59th St., Los Angeles, Calif.*

**American Chemical Paint Company, Ambler, Pa.**

Please send me general Technical Service Data Sheets on

☐ Rodine ☐ Cuprodine

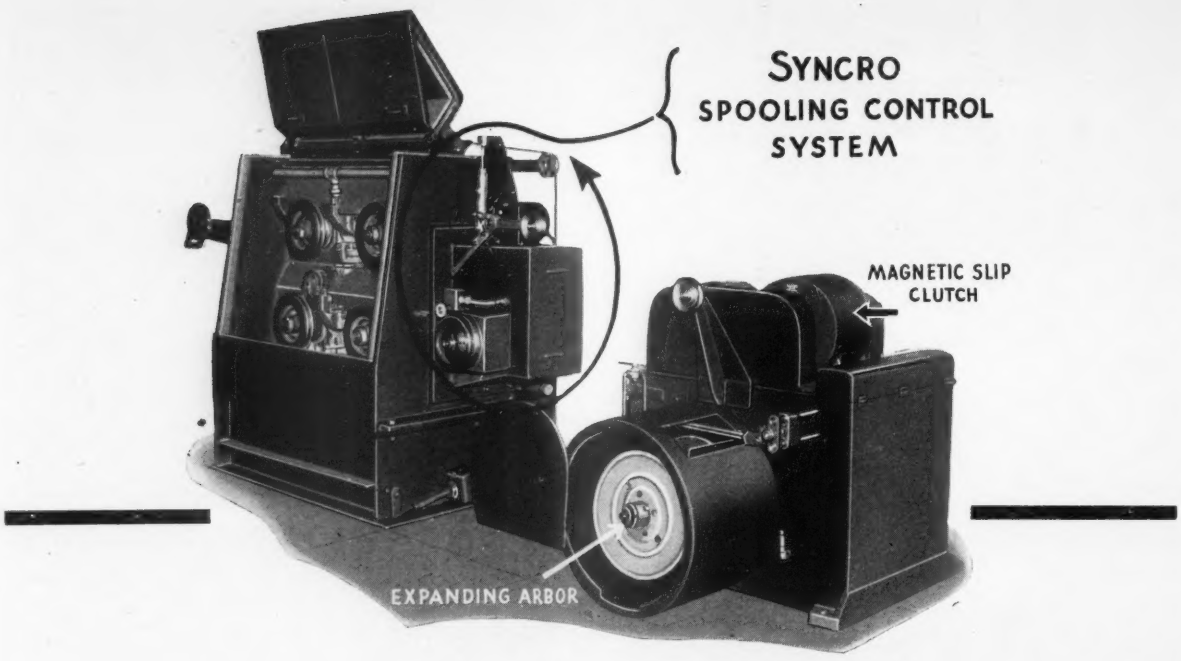
*Name*_____

*Title*_____

*Company*_____

*Address*_____

D-8




# Syncro Automatic Spooling Control provides

## equal spooled wire tension from core diameter to full spool

The Syncro Automatic Wire Tension Control System for Syncro Wire Drawing Machines has proved its efficiency and value in actual operation in many wire mills.

This system consists of a Syncro Magnetic Slip Clutch driven spooler, operating in conjunction with Syncro's own design of built-in capstan control. This combination results in a smooth, automatically compensating spooler drive, equipped with adequate and readily adjustable tension control for various wire sizes. The tension control is easily adjusted to provide constant and equal wire tension from core diameter to full spool. Another important advantage of this system is that it eliminates "slip" on the finishing capstan during deceleration, which reduces wear and prevents "burning off" of wire.

Complete details upon request.

**SYNCRO MACHINE COMPANY**

RAHWAY, NEW JERSEY
McCORMICK BLDG., CHICAGO

REPRESENTED IN CANADA BY CANADIAN ELEVATOR EQUIPMENT CO. LTD., TORONTO

*Machinery for the Wire Industry*

SYNCRO

# Can You Use One or More *of these Booklets?*

A Handbook on TOOL ROOM GRINDING
A Primer on GRINDING WHEEL SAFETY
GRINDING "HAYNES STELLITE" CUTTING TOOLS
NORTON ABRASIVES
A Handbook on THREAD GRINDING
ABRASIVES AND GRINDING WHEELS
A Handbook for Grinding Apprentices
NORTON CUT-OFF WHEELS
GRINDING CARBIDE TIPPED TOOLS
The A B C of O. D. Grinding
CYLINDRICAL · CENTERLESS

## Norton offers this Practical Help to the War Industries

Information on many kinds of grinding — gathered by Norton engineers in the field and in the laboratory — has been made available to industry in a series of Norton booklets, eight of which are illustrated here. They are especially helpful to plants doing war work, most of which must turn out new products with new help.

Write for any or all of these booklets or ask for the folder "The Know-How of Grinding" which illustrates and describes the many Norton informative books and also gives information on Norton motion picture films and the Victory Grinding Course.

**NORTON COMPANY, WORCESTER 6, MASS.**

W-927

NORTON ABRASIVES

# UPRIGHT ★ ★ ★

# ★ ★ ★ CONE

Wire Drawing Machines

FOUNDED WATERBURY FARREL 1851

These high speed machines are available in several sizes and can be had with either a coiling block or spooler. The spooler may be an attachment or a separate floor-type device, such as shown. This is the No. 4 machine with belt-type cradle spooler. It is driven by a direct-coupled motor (not shown), has 13 dies and capacity for drawing copper from ¼" maximum starting size down to a finishing size of from No. 10 to No. 18 B. & S. gage. The dies and the hardened steel drawing rolls are enclosed by a rolling steel curtain to confine the splash of the drawing lubricant.

**WATERBURY-FARREL**
**FOUNDRY & MACHINE COMPANY**
Waterbury, Connecticut, U. S. A.
SALES OFFICES CHICAGO CLEVELAND NEWARK, N. J.

# WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 18 AUGUST, 1943 No. 8

Designated as

Official Publication By The Wire Association


## Contents


Getting to the Roots of Absenteeism ..... By U. S. Department of Labor 447

The Service Behavior of Plated Steel Wire as Indicated by the Corrosion-Fatigue Test ..... By John N. Kenyon 449

A Chronology of Wire and Wire Products ..... By F. R. Morral 451

Volute Spring Research ..... By J. W. Rockefeller, Jr. 455

Metal Working in Powder Metallurgy, Part III ..... By Claus G. Goetzel 457

Metal Industry Will Meet in Chicago ..... 460
Plans Announced for National Metal Congress

Tentative Program for 1943 Wire Association Convention ..... 439

Government Wire Production Information ..... 462

American Iron & Steel Institute Statistics — May, 1943 ..... 467

Automatic Tension Control ..... By M. A. Kelafant 470

Outstanding Personalities of the Wire Industry ..... 472

A Review of Recent Wire Patents ..... 474

Index to Advertisers ..... 489

Where to Buy ..... 489-492



— ASSOCIATE EDITORS —

Kenneth B. Lewis, Consulting Wire Mill Engineer
W. H. Spowers, Jr., Consultant on Galvanizing
Lancaster, Allwine & Rommel, Consultants on Patent Information

Richard E. Brown, General Manager
R. S. Spengel, Business Manager
E. D. Sickels, Advertising Manager



Publication Office: Washington, N. J.
Executive Office: Stamford Trust Co. Bldg., 300 Main St., Stamford, Conn.

Annual Subscription, U. S. $5.00, Canada $5.00

50 Cents a Copy in U. S. Issued Monthly Foreign, $7.50

October Convention Issue $1.00 a Copy

January Convention Discussions Issue $1.00 a Copy



Copyright 1943, Quinn-Brown Publishing Corp. WIRE AND WIRE PRODUCTS is fully protected by copyright and nothing that appears in it may be reprinted wholly or in part without permission.

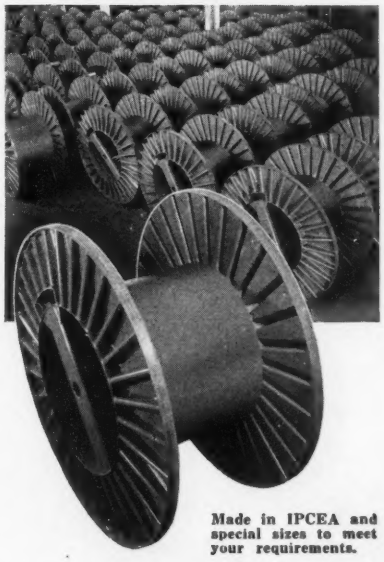


WIRE & WIRE PRODUCTS, Vol. 18, No. 8, August, 1943, Executive Office, 300 Main St., Stamford, Conn. Published by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Secretary and Treasurer. Publication office, 13 West Church Street, Washington, N. J. Subscription price: U. S., $5.00; Canada, $5.00 per year, 50 cents per copy; Foreign, $7.50 per year. Entered as second class mail at the Post Office, Washington, N. J., under Act of March, 1879.



Stevens

LOW-TARE
Shipping Reels
*and*
Flanged Steel
Traverse



Made in IPCEA and special sizes to meet your requirements.

ALL STEEL Construction
*PROVIDES*
LOW WEIGHT and
LONG LIFE ECONOMIES

They are built to last—sturdy at the hub, and engineered with shock absorbing characteristics to withstand side stress. Write for interesting data and prices.

Manufactured under license arrangements with Western Electric Company, Incorporated.

THE STEVENS METAL PRODUCTS CO.,
NILES, OHIO

# FIRTHALOY

## THE STANDARD CARBIDE*

## FOR ENDURANCE

FIRTHALOY'S **endurance** factor means fewer demands on the die room, smaller stocks, and minimum outlay for reconditioning.

The **longer life** obtained by replacing other dies with Dies that are super hard, super wear-resistant, has helped Wire Mills to produce accurate Wire in the huge amounts required by this War. FIRTHALOY is the super material responsible.

*ASK THE TRADE!

ARMY E NAVY

**Firth-Sterling**
STEEL COMPANY

Offices: McKEESPORT, PA. · NEW YORK · HARTFORD · PHILADELPHIA · CLEVELAND · DAYTON · DETROIT · CHICAGO · LOS ANGELES

# WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip. Wire Products and Insulated Wire and Cable.

DRAWING --- ROLLING --- EXTRUDING --- FORMING --- FABRICATING

Vol. 18 AUGUST, 1943 No. 8


# Getting To The Roots of Absenteeism


By U. S. Department of Labor,
Division of Labor Standards,
Washington, D. C.



A discussion of the causes of absenteeism in industry and some suggested methods for relieving the situation and increasing the number of man-hours of production.


THE men who fly our planes started this talk about gremlins. They dreamed up these vicious little men who plague them with troubles that may mean death or the long vigil for rescue. The dangers are real, even if the gremlins are not.

✦ ✦ ✦

THERE is one tribe of gremlins unfamiliar to our boys in uniform but just as dangerous to them. These gremlins make a war cry of "Too little and too late." They plague the people in our factories with illness, accidents, transportation difficulties, and all the many other causes of lost time known today as absenteeism. Through this means they slow up production of equipment and supplies so badly needed at the front. These gremlins, of course, are just as imaginary as their air-minded brethren, but, again, the troubles they cause are real.

THIS is perhaps a new way of presenting an old subject—absenteeism, which has always been present in industry. It is serious now because of war labor shortages. Unexpected vacancies on the production line cannot be filled fast enough to maintain output schedules. As our young men have entered the armed services, the demand for labor has brought into war plants many people who are unaccustomed to industrial life—women, older workers, youngsters, boys about to be drafted, and people physically below par. They are giving their best efforts to their jobs but often reasons beyond their control make steady performance impossible. The major responsibility for controlling absenteeism rests with management, and the job can be done only by eliminating the basic causes.

✦ ✦ ✦

THIS is the attitude of responsible officials in over 200 war plants reporting their experience in controlling absenteeism to the Division of Labor Standards, U. S. Department of Labor. [1]This material indicates the methods of control tried at the plant level, and the degree of success which might be attained if these methods were more generally used throughout the country. The firms covered include wire and wire products manufacturers, shipyards, aircraft plants, electrical and chemical firms, precision instrument companies, utilities, textile mills, food concerns, and

[1]**This experience is summarized in "Controlling Absenteeism—A Record of War Plant Experience," available on request from the Division of Labor Standards, U. S. Department of Labor, Washington, D. C.**


**Designated as Official Publication by the Wire Association**

others engaged in war work and operating in every large industrial State.

✦ ✦ ✦

A NUMBER of these firms pointed out that discipline alone will not control absenteeism and, in fact, penalty lay-offs in the face of labor shortages impede production. In the words of **O. M. Swanson,** Personnel and Safety Director of the Joslyn Manufacturing and Supply Company of Chicago, (complete pole line equipment) " . . . A punitive measure applied would prove disadvantageous. . ."

✦ ✦ ✦

TO get at the basic causes—the first step in controlling absenteeism, various methods are used. **N. L. Heiny** of the General Cable Corporation, New York, reports that his company has assigned personnel to investigate all unexplained absences. "It is felt that personal contact with individual employees," he says, "can result in a better understanding and control of the factors causing absenteeism."

✦ ✦ ✦

D. W. DAY, Personnel Manager of the Chain Belt Company, Milwaukee, describes this method of getting at causes: "We use the conventional time card and clock to keep track of the employees' time, and now when an employee is absent for one day the clock card is removed and in its place is a card calling his attention to the fact that he has been off at least one day, and that he should report to his timekeeper to obtain his time card . . . On the reverse side of this same card we have a space for the employee to enter his reason for absence and place for his signature. The card is then forwarded by the timekeeper to the Personnel Department where it is filed with his file."

✦ ✦ ✦

THE foreman can play an important part in controlling absenteeism. In interviews with returning absentees, he can check closely on the real reasons for absence and report them so that management can try to ameliorate or remove them. He can convince absentees of management's sincere interest in their problems and can show them how important their regular attendance is to the war effort.

✦ ✦ ✦

OFTEN workers do not realize that the product they manufacture plays a vital part in getting supplies and equipment to the boys at the front. **R. M. Monk** of the Caterpillar Tractor Company, Peoria, Illinois, says, "If our employees realize the importance of regular attendance and appreciate the importance of their role in the war effort, absenteeism can be controlled. Without such an understanding all other measures are doomed to failure." Firms often use posters, bulletin boards and house organs to play up the need for sticking to the job. **G. C. Munoz,** American Pulley Company, Philadelphia, describes a poster put up in that plant, furnished by the Hyatt Roller Bearing Company. It reads, "You can't spell Victory with an absent 'I'!"

✦ ✦ ✦

THE work of the foreman and publicity on absenteeism, to be effective must be backed by clear management policies, continuing management interest in reducing absenteeism and good personnel practices. For example, some companies schedule work ahead and post such schedules for all workers to see. They also try to pre-plan absences. If workers know that work is laid out for them and that they are being counted on, they will hesitate to be avoidably absent. If they also know that the company has explicit and liberal rules with respect to excused absence, they will more willingly try to plan their absences in advance and notify their foreman. Planned absence permits replacement and prevents interruption of production.

✦ ✦ ✦

OF course absences from such causes as illness or injuries or transportation difficulties cannot be pre-planned, and they account for a major part of absenteeism. These causes can be attacked directly.

✦ ✦ ✦

MR. HEINY of the General Cable Corporation says that his firm has enlarged its accident prevention program. Many other plants are taking similar action, since wartime demand for speed, employment of inexperienced workers, long hours, maintenance problems growing out of round-the-clock production, overcrowded workshops, and the use of new chemicals and new processes all tend to increase the number of industrial casualties. Help in combatting accident and health hazards may be secured from the U. S. Department of Labor's National Committee for the Conservation of Manpower in War Industries, which operates through the Division of Labor Standards. Over 500 of the country's leading safety engineers have been enrolled on a voluntary part-time basis to assist war plants in organizing sound safety and health programs. More than two-thirds of the 10,000 war plants serviced by the Committee last year markedly reduced accident frequency as well as severity.

✦ ✦ ✦

ORDINARY illness is by far the most serious cause of absenteeism. How much of this is due to community infections and how much to long hours, industrial fatigue, and poor working conditions is impossible to determine.

✦ ✦ ✦

PRESENT hours schedules may be an added strain for workers already handicapped by home responsibilities or physical disabilities. When daily and weekly hours are too long, the rate of production tends after a period to decrease, and the extra hours add little or no additional output; the quality of work may deteriorate during the whole period of work, not only during hours of overtime; absenteeism rises sharply; the loss of time due to accidents and illnesses tends to increase.

(*Please turn to Page 468*)

# The Service Behavior of Plated Steel Wire as Indicated by the Corrosion-Fatigue Test

By John N. Kenyon

Research Engineer, New York, N. Y.

A short discussion on the corrosion fatigue test undertaken to show what protection is afforded steel wire by certain types of plating.

## Statement of the Problem

UNDER the most favorable of service conditions there is a slight deterioration in metals due to the gradual inroad of corrosion. These attacks may be so slight in nature that there is no appreciable lowering in tensile and ductile properties and only a slight loss in metal expressible in grams. Yet if these same metals are simultaneously subjected to cyclical stress (variable loading) a corrosive attack, however slight, may have a most pronounced effect on the endurance properties. Since corrosive attacks are considerably retarded by metallic platings, this study was undertaken to show what protection is afforded steel wire when the platings are more "noble" and more "basic" than the steel itself.

## Test Procedure

THE corrosion-fatigue data obtained by this study was with the Rotating Wire Arc Fatigue Machine. This method is described in the A. S. T. M. Technical Papers of 1935 and 1940. The functioning principle of the machine is essentially that of bending a straight length of wire to a curve by means of two bearing metal guides and rotating it from one end by a motor. The other end of the specimen is free to slide longitudinally in its guide and, in so doing, **automatically assumes the curvature of the circular arc.** Thus some 15-in. of wire is subjected to equal stress reversals with fatigue failure occurring at the weakest point within this length. The rotating arc dips into a liquid bath that serves the dual purpose of dampening out vibrational effects and acting as the corrosive medium. See Figure 1.

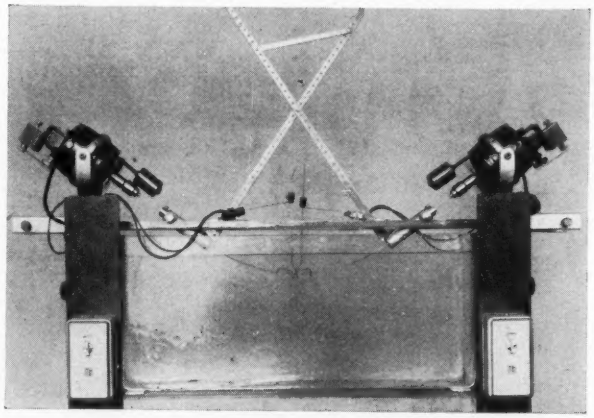


Fig. 1. The Rotating-Wire Arc Fatigue Machine showing two wires being tested simultaneously. Note: Exposure of 15 seconds with the motors operating at 6000 rpm.

✦ ✦ ✦

## Test Materials

THE materials used for the study were 0.66 carbon steel wire drawn

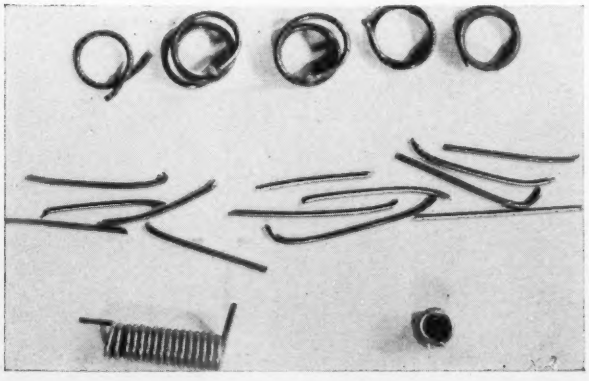


Fig. 3. Showing the relative ductile properties of wire after the corrosion-fatigue test. Top—Unplated wire. Center—Bronze plated. Bottom—Copper-zinc plated (x2).

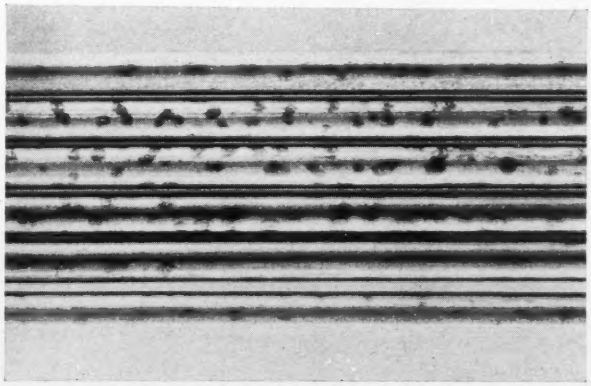


Fig. 4. Showing the attack on the steel wire due to the corrosion-fatigue test. The bronze plate has been dissolved off with ammonia (x12).

to 0.037-in. diameter. These materials were from the same coil of wire and differed only in the platings. See Table I.

TABLE I

| Designation | Plating | E (x10⁶) | Tensile Strength | Fatigue Limit | Ratio FL/TS |
|---|---|---|---|---|---|
| Unplated | None | 29.9 | 284,000 | 99,000 | .348 |
| *Bronze | copper by displacement | 29.3 | 283,000 | 91,000 | .321 |
| Cu-Zn | hot dip zinc + electro copper | 29.5 | 275,000 | 95,000 | .345 |

*Note: Bronze plate is copper containing a trace of tin or zinc.

✦ ✦ ✦

## Discussion of Results

THE test data are summarized in the S-N curves of Figure 2. The curves 1, 2, 3 (non-corrosive) show high uniformity in materials considering that the wire was commercial processed and that fatigue failure could occur within a length of some 15-in. These curves are closely grouped indicating no material effect due to the platings; in fact the relative order of these curves might be reversed for another coil of wire.

✦ ✦ ✦

THE corrosion-fatigue data obtained in distilled water reveal interesting, though perhaps not conclusive information on the protection afforded by the platings. The bronze plated material was about on a par with the unplated while the copper-zinc plated material was markedly better. At a stress of 45,000 psi the unplated and bronze plate withstood an average of 1.7 million stress reversals while the copper-zinc material withstood 9.0 million. This is a ratio of over 1:5.

✦ ✦ ✦

THE most interesting aspect of the study was the ductile condition of the materials after the corrosion-fatigue test. The unplated wire had retained some ductility and, with an occasional break, could be bent to a helix around a ¼-in rod. The copper-zinc plated wire could be bent with ease about an ⅛-in rod while the bronze plated material could be broken into ½-in lengths with the fingers. See Figure 3.

✦ ✦ ✦

AFTER test, the bronze plated wire appeared visually bright but with pin-like corrosion spots. A removal of the copper with ammonia revealed a mottled, almost disease-like, attack on the steel. These corrosion spots, often averaging about 0.02-in. apart, are believed to be associated with pin-hole imperfections in the plating. The microscope revealed that practically all corrosion pits had fatigue cracks in various incipient stages

(*Continued on Page 471*)

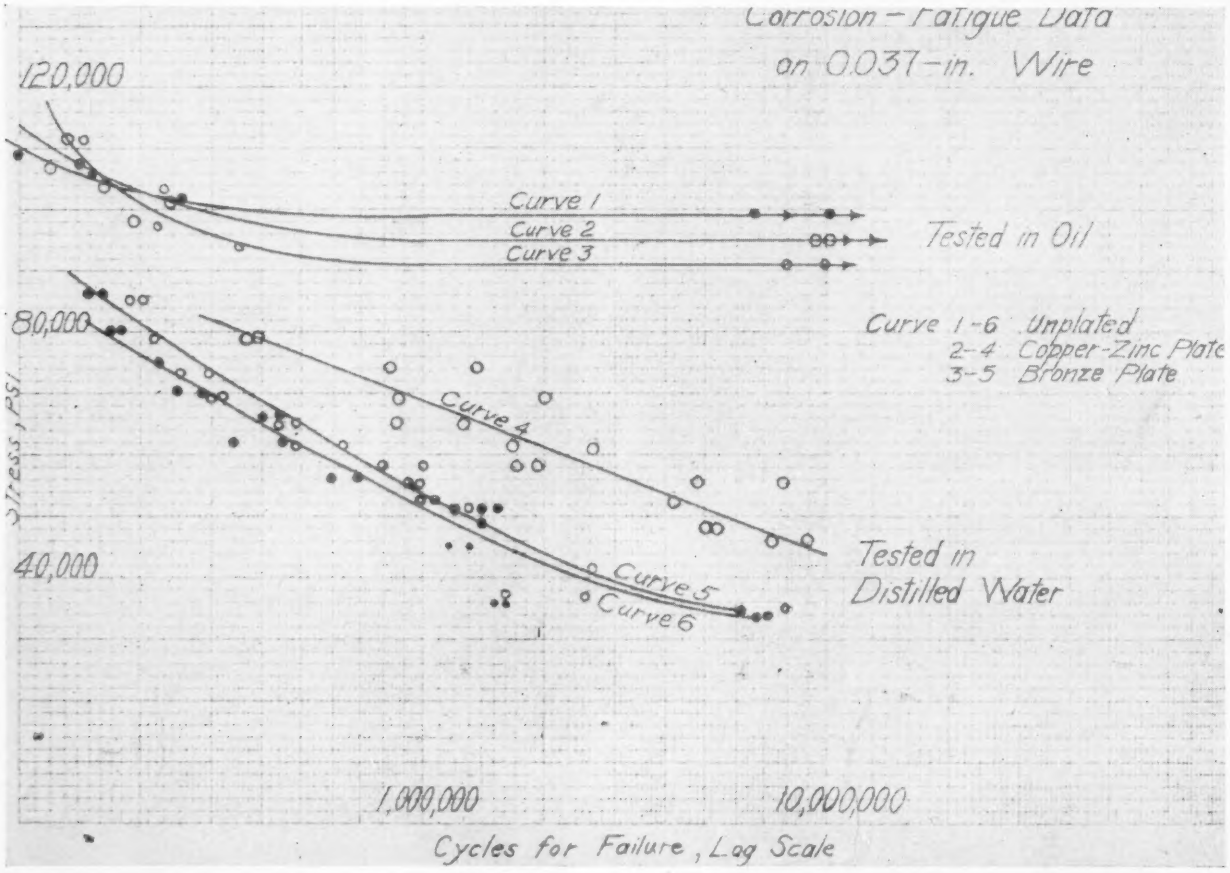



Fig. 2. ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦

# A Chronology of Wire and Wire Products

Compiled by F. R. Morral,
Industrial Fellow, Mellon Institute of Industrial Research,
Pittsburgh, Pa.

The chronology of wire presented here represents research work which delved into French, German and English magazines and publications as well as American sources. The author states that he made a complete search of all books on patents and inventions he could find as well as all magazines published in several different languages and presents his conclusions herewith. Readers are invited to send in additional or missing data in order to develop as complete a history of wire production as may be possible.

B. C.

8000 Copper found by early man.

4600 specimens of wire believed to belong to this date found by Petri (1901).

4700-3800 Bronze made by deliberately alloying copper and tin.

4000 Egyptians acquainted with iron.

3745 Crown made of wire belonging to queen Shubab of Samaria assigned to this time (C. L. Wooley in "Ur of Chaldees").

3000 Gilding and bronzing done by means of finely powdered metal in suspension in a suitable vehicle.

2750 A necklace belonging to an Egyptian Pharaoh of this time found at Dendarab. The necklace consisted of oval gold plates connected by a "crude chain of gold wires."

2500 Shu King — earliest known mention of copper in literature.

1700 Wire is used in Assyria and Babylon. Archeological evidence is good that in these times wire was made by shearing the wire from plates.

1544 Thirty-six pound garment of woven metal fabric found in tomb of wife of Emperor Honorius of Rome.

1491 Exodus XXIX — 3, in the Old Testament was written . . . "beat the gold into thin plates and cut into wires . . . "

1400 Greeks start to use iron.

1055 I Chronicles XXII-3 . . . "and David prepared iron in abundance for the nails, for the door of the gates . . . "

1000 Bronze wire believed of this time found in Scotland (1879).

850 Homer refers to the making of wire for net to catch Ares and Aphrodite by Vulcan. (Odyssey VIII p 273-8).

800 Bronze wire rope of this period unearthed at Niniveh (a sample of which is to be seen at the British Museum).

406 Sophocles spoke of the tempering of iron in water.

322 Aristotle wrote of the "bleaching of copper," forerunner of "dry galvanizing."

300 Fire or amalgam gilding known. Applied with silver as well as with gold usually on brass or copper. Theophrastus appears to have written at least one book on metallurgy. (no copy is in existence).

A. D.

77 Natural History by Pliny the Elder published. He mentions wire and the tinning of cast iron utensils and indicates that this method of coating was known since an early date.

79 Pompeii destroyed. A bronze wire rope found in this city.

300 A crude rough wire die found in France, believed to belong to this date.

660 Wire filigree cross made by St. Eloy (to be seen in an abbey in Paris).

700-800 Vikings in Norway used wire dies at this time according to archeological finds.

6th. to 10th. century it is believed that Venetians and Italians have known of the method of drawing wire through holes in drawplates.

1100 (?) Theophilus, a German monk, the first writer to refer to and describe drawplates. A foot of wire was drawn at a time. He also describes case hardening. (Translation by Robert Hendrie, 1847).

1270 Wire drawing commercially applied in France.

1280 Albertus Magnus first to mention metal zinc by this name.

1300 The importance of fracture appearance recognized. Eninad-Din author of the 13th. century wrote . . . "when you look at a sword, look at it both inside and out."

1351 Rudolph of Nuremberg applies water wheels to wire drawing. Some authors attribute the first use of drawplates to Rudolph. Records of this time start to use the word "drawer," before it was mostly "wire smith."

1370 Hammering of wire still used in Nuremberg. The making of needles of bronze an important branch of industry in this city.

1443 A book of this time mentions the making of wire for armored shirts.

1447-1450 A wire flatting mill was operating in Breslau.

1465 England prohibits the import of wire. The restriction was soon removed because of the inferiority of home product.

1456 Johan von Clever obtains privilege of wire drawing for Altena. Other important wire producing centers in the Germany of this period were Iserlohn and Ludenscheid.

1460 There is a considerable wire industry at Coventry, England.

1490 Conrad Celtes writes about Rudolph of Nuremberg who had kept his process secret.

1500 France ascribes wire drawing to Richard Archal.

1506 Wire mill set up in Zwickau.

1509 Ebener separated zinc as a metal.

1540 "Pyrotechnica" of Vanuccio Biringuccio has a sketch of an Italian wire mill in the IX book Chapter 8. He also writes about the technique to draw gold into wire, as well as silver, iron, copper and brass.

1546 Agricola in his De Natura fossilium (libro IX) mentions that the tinning of articles is well known.

1556 Georgius Agricola's "De Re Metallica" published in Basel.

1564 Very elaborate drawbench from this period is on exhibition in the Musée de Cluny, Paris, France.

1565 In England wire was handdrawn only to this date. Patents granted to certain Germans or Dutchmen. (Christopher Schultz and Caleb Bell) allowing them to set up a wire mill.

1570 Tournier took work on silver and gold to Germany, where Hackhel in Allersberg made it flourish.

1575 Tintern Abbey wire works in Monmouthshire started by four German families.

1600 About this time an invention for slitting flattened bars of iron into strips, called nail rods, introduced in England.
Johann Gerdes of Altena, Germany, discovered how to draw steel, although other kinds of wire had been drawn before.

1606 Patents granted in England to Sir D. Bulmer and C. Dawbeny, respectively, for cutting iron into nail rods by water power.

1617 Sir David Bulmer invented a machine for cutting nail rods.
At this time many women and girls forged nails in England.

1620 Iron works at Falling Creek, in Jamestown River, Virginia operating.

1624 Wire drawing introduced in Sweden by the Walloons of Flanders.

1630 Charles I of England again forbids the import of wire.

1643 First iron works established in what is now the U. S. at Lynn, Mass.

1649 Copper and brass wire manufactured at Esher, England.

1650 First wire made in the U. S. A.
At Altena, Germany, a wire drawer discovered by accident the possibilities of drawing high carbon steel wire by giving it a "sull coat."

1663 First mechanical wire mill in England set up at Sheen, near Richmond, Surrey, by Dutchmen.

1666 Nathaniel Robinson a "wyer drawer" of Lynn, Mass. petitioned the Court for aid in carrying on his trade. He also made pins from native copper.

1667 Joseph Jenks rolled charcoal iron into plates. The plates were sheared into square rods to form the raw material for wire drawing.

1669 Brand (Germany) discovers phosphorus.

1710 First nail rod slitting mill erected in U. S. A. in Milton, Mass.

1721 Samuel Bissel receives £200 to encourage nail manufacture in Rhode Island.

1726 Eckerman (Sweden) invented flat wire, which he used in clothes.

1728 Fleuer, a French iron master, prepared a schematic production layout of his idea of a wire mill complete with time studies and calculations. In his plant he pushed up production ten times the best previous figure.

1731 A nail factory is built in Massachusetts.

1734 Swedenborg (Sweden) wrote first and oldest handbook of iron metallurgy "De Ferro." He visited plants in various European countries.

1735 Colombium discovered by Brandt (Sweden).

1740 Huntsman (England) invented the crucible melting process for steel.

1741 Kenkel discovered zinc.

1742 Von Schwab first produced metal zinc by distillation of calamine.

1740-'45 Fleuer had a complete wire and nail mill in successful operation in France.

1746 Dr. Roebuck of Birmingham (England) built the first lead chamber for the manufacture of sulfuric acid.

1750 Sir William Watson first described Platinum (England).
At this time a greasy rag was placed near the wire die.
Wire reaching gage 7 had had 20 to 25 drafts and 3 anneals.
The loss was usually 25 per cent according to the reports from one plant.
In this year zinc is used for hot dipping.
England attempts to make wire for musical purposes from steel.

1750 It was found that beer gives iron wire a sull coat. Rinman (Sweden) suggested soaking steel wire in lime water. He also reported that pyroligneous acid would remove scale but only after immersion for one or two months.

1751 A. F. Cronsted first isolated nickel.

1754 Henry Cort (England) built the first iron rolling mill.

1760 Revolving wire drawing block possibly applied to coarse wire at this time.

1761 Book published on "L'Art de l'épinglier" (needle manufacture) by René Antoine Ferchault de Reaumur. He is considered to be the first to actually systematize metallurgy.
C. Pohlem (Sweden) inventor of various machines and apparatus used in the metal and other industries wrote his "Patriotic Testament" giving details of his inventions. Among others he designed a shear to cut nails.

1764 Gallon writes a treatise on methods of producing wire.

1766 John Purnell (patent 854) invented machine for making ship bolts, large round rods of iron and steel, and iron and steel wire of various sizes by rolling.

1769 Ford obtained a patent for a mill consisting of several stands.

1769 Henri Louis Duhamel du Monceau publishes "L'art de reduir le fil en fer" (Art of iron wire manufacture).

1770 A rolling mill and slitting mill built at Boonton, Morris Cty., N. J. by member of Ogden family.

1772 Introduction to the metallurgy of iron and steel ("Anledning till stal och Jernsforaldlingen och des förbättring") with a chapter on wire drawing appears by Sven Rinman. Amongst other things he recommends to dip the wire before annealing in a mixture of 2 parts of lime and 1 part of clay, which is thinned out with water. He describes a wire mill.
Wire rope invented by Berghauptmann (mining engineer) von Reden.

1773 Sven Rinman, reduced manganese to the metallic state.

1774 Galm (Sweden) isolates manganese. Scheele in this year in a paper describes his discovery of manganese (Sweden).

1775 Nathaniel Niles in Norwich, Conn. established a wire factory. This was apparently the start for the commercial importance of the wire industry in the U. S.

1774 Lesjugo publishes textbook in Luebeck. His material seems to indicate that diamond and sapphire dies were used in his day in drawing plates.

1777 Jeremiah Wilkinson, of Cumberland, R. I. made the first cold-cut nail in the world, according to a Rhode Island historian.

1780 Hjelm (Sweden) discovered molybdenum.
Frenchman Reignier invented an arrangement which permitted to make wire rope.

1783 d'Elhuyar Brothers (Spain) first obtained tungsten in the metallic state.
Henry Cort took out his first patent in England on the use of grooved rolls.

1786 Guyton de Morveau (France) isolated and defined two types of carbon in steel: iron carbide and graphite.

1787 J. G. Pierson patents nail cutting machine. At this time he made nails in New York City.

1788 A large wire mill was operating in Dedham, Mass. making wire for cards (textile industry) and fishhooks.

1789 Klaproth (Germany) isolates zirconium.

1790 Jacob Perkins of Newburyport, Mass. invented a nail cutting machine (200,000 nails per day) (patent 1795).
T. Clifford made a type of machine for forming nails.

1791 Gregori (England) isolates titanium.
In Pittsburgh wire imported from abroad is reduced in size.

1792 In Dover, N. J. I. Canfield and J. Losey established a rolling and slitting mill. They also added a factory for cutting nails which nails were headed by hand in dies.

1795 First nail mill west of the Alleghenies built at Brownsville, Pa. by Jacob Bowman.

1796 Samuel Gypsy got patent for rotating machine to cut nails and head them.

1797 Patent obtained by Harris of Waltham Abbey, Essex, to make needles by machine.

1798 Vauquelin (France) isolates chromium.

1800 Light scale on annealed wire removed by boiling the wire in tartar.
Wire to gage 20 has 40 drafts and 6 anneals in one of the mills described at this time.
Last ten years (1790-1800) 23 patents were taken out in the U. S. on nail cutting machines.

1801 Del Rio (Mexico) discovered vanadium.

1802 Buschaendorf of Leipzig (Germany) recommends use of sal ammoniac instead of resin, as a flux in galvanizing and tinning.
Joseph Bramah of London, applied the hydrostatic press to cranes for

hoisting merchandise and afterwards to tools in his own workshop.

1806 Substitution of vitriol for barley meal as a medium for pickling purposes of tin sheets.

1811 A loan was granted by the Pennsylvania legislature to William Eichbaum, of Pittsburgh, to enable him to complete and operate a wire mill.

1813 Dr. W. H. Wollaston first succeeded in drawing platinum wire 1/30,000 inch in diameter.
Clemens Rentgen built a plant to roll round iron in Chester, Pa. The U. S. had granted him a patent in 1810.

1815 Rod rolling done by William Bell in England.

1816 White and Hazard of Philadelphia first made wire fence. First wire suspension bridge in the U. S. thrown across the Schuylkill river near the Schuylkill Falls in Philadelphia.

1818 Rod rolling done by Thomas Todd and W. Church in the U. S.

1819 Brokedon patented use in fine wire draw plates of the hardest precious stones drilled with orifices of the sizes required.

1820 Dr. John W. Revere of New York presumably electrogalvanized wire using voltaic batteries. (The New American Cyclopedia vol. 8 p. 65). By chance it was found in England that a thin copper coating facilitated the drawing of wire.

1821 U. S. produced 250 tons of wire per year (?)

1822 Use wire rope for suspension bridge at Geneva.
Albrecht, in Clausthal, Prussia, used wire ropes for winding in shaft.

1822 Stoddard and Faraday showed that ordinary metals dissolve faster in acid when galvanic couples are present.

1823 Berzelius (Sweden) isolates silicon.

1824 L. W. Wright invented a machine by which a perfect pin was produced during the revolution of a single wheel.

1825 Oersted (Denmark) discovers aluminum.
Up to this time 120 patents granted in the U. S. on nail manufacture.

1826 Charles Barnard of Norwich, Conn. started the wire netting industry.

1828 Karsten developed what is now known as the "rod mill," a three high mill.
Fine wire, size not specified, was getting 35 - 40 passes and 4 to 5 annealing treatments.

1830 Ichabod Washburn built first three high rolling mill at Fall River. He experimented from 1821 to 1830.
A treatise dealing only with wire drawing published that the production of coarse wire per man was 50 pounds per day.

1832 A committee of the Franklin Institute designed and built a tensile testing machine.

1834 Three wire mills in the U. S. Total output 15 tons per day.(?)
Fine wire woven into sieve cloth by B. Gilbert of Georgetown, Conn.

1836 Hot dip galvanizing patented by Sorel (France).

1838 Sept. 28. The minister of Marine in France gave instructions to test the method of protecting iron by hot galvanizing. The tests lasted until May 14, 1840. The report recommended to have wire exposed to gases coated, as well as nails. Soon afterwards hot galvanizing of steel wire became important.
Niles Berry obtains a patent on galvanizing by cementation. This method was unsuccessful because he failed to use blue zinc powder.

1839 Rod mill built at Fall River, Mass. The first important improvements in American practice in producing wire rod were incorporated. Twenty-five pound billets were used. This mill burned down and was rebuilt in 1843 with more improvements. It is said that the capacity was doubled.

1840 Roebling makes first wire rope in the U. S.
Electrodeposition of silver from cyanide solution found by Dr. John Wright, M. D.

1862 In England, Bedson is originator of continuous rod rolling.
Washburn succeeds in adapting the wire drawing block to coarse wire drawing.

1841 First patent issued on cadmium plating in England.

1842 G. Elkington established at Birmingham (England) the first plant for practical electroplating.
Cobalt successfully electrodeposited. (1842-'5)
Large part of the Morse telegraph wire first laid between Washington and Baltimore was rolled on the continuous mill invented by J. E. Serrell (U. S.). First recorded patent and originally planned for rolling lead and copper pipe.

1843 G. Ekman (Sweden) invented a continuous heating furnace for heating long rods or billets.

1844 Wire netting up to present time done by laborious process.
At this time it actually became an industry and is associated with C. Barnard of Norwich, Conn.

1847 The demand for telegraph wire began (Stubbs gage No. 9) sometimes painted or boiled in oil to prevent rusting.

1848 Max Pettershofer proposes the copper sulfate test for galvanized telegraph wire. Later became known as "Preece test."

1847 First loom in U. S. for weaving Fourdrinier wires made by Cornelius van Houten, Belleville, N. J. from a model brought from England.

1850 Water found satisfactory to sull iron and steel wire.

1851 First wire nails made in U. S. by W. Hassall from iron or brass.
Wire nail machine built by Thomas Morton in New York City. This machine operated for 52 years (on exhibit at the American Steel and Wire Industrial Museum).

1854 English patent to Charles Cleophas Person, an early record of electrogalvanizing.
Bunsen (Germany) reported the electrodeposition of chromium.

1855 Brown and Sharpe gage based on geometrical system proposed.
March 6, American Iron and Steel Association founded in Philadelphia.

1856 Manufacture of poultry netting fabric started in Clinton, Mass. (1850-'6) Kelly in the U. S. and H. Bessemer in England invented the converter process of refining iron.

1857 I. Washburn, Worcester, Mass. developed and patented the continuous process of hardening and tempering for music and crinoline wire.

1858 G. Bedson drew the wire for the Dover-Calais submarine cable; 950 tons of wire of No. 22 best charcoal iron wire for half of the first Atlantic submarine cable.
The American Standard Wire Gauge, originated by Brown and Sharpe, was adopted by The Brass Manufacturer's Assn.

1860 The Bedson process for continuous hot dip galvanizing of wire described in Annales Télegraphique of Paris. Cuck described a wire galvanizing plant. I. Washburn introduced the above method of continuous annealing, cleaning and galvanizing in his plant in Worcester, Mass. about 1866.

1861 Dingl. Pol. Jl. vol. 161 (1861) p. 194 Reichenberger describes a galvanizing unit in Bavaria.

1861 The Cambria Iron Co. was the first to employ a chemist at an iron works laboratory.

1862 Siemens invented the open hearth process.
G. Bedson, Manchester, England, patented his continuous rod rolling mill, which produced 20 tons of No. 5 iron wire rods in 10 hours.

1863 H. C. Sorby first applied the microscope to the study of metals.

1865 The Martin Brothers in France developed the pig and scrap process in lieu of the pig and ore process of Siemens.

1866 Bedson wire galvanizing process used in Manchester described in Ann. Télegraphique p. 445.
First American open hearth erected in U. S. at Trenton, N. J.
On Nov. 27, 1866, a petition was filed in Massachusetts to form a corporation "for making wire and wire rods, cotton yarn and foods, with a capital larger than at present allowed." The petitioners were asked to be incorporated under the title of Washburn and Moen Wire Works with a capital of $600,000.

1867 April 2nd. A. Dalb obtains U. S. letters patent 63,482 for pricked wrought iron strips.

1868 June 25, L. B. Smith; July 23, W. D. Hunt; February 11, M. Kelly — patents embodied the basic ideas in barbed wire construction.

March 10, W. Towbridge, New Orleans, La., obtains a patent which developed into a practical wire bale tie.

1869 C. H. Morgan, Worcester, Mass. designed and used a power traction reel for wire rod. Shortly afterwards he developed a pouring automatic reel. With an assistant he also designed the "whirling pipe."

1869 Wire bale tie industry established by Laughland and Lowber, N. Y.

1870 Started to use diamond dies in wire drawing.

1871 Washburn and Moen Mfg. Co., Worcester, Mass. first to substitute bessemer and open hearth steel for wrought iron for wire making.

1873 A. L. Holley in a paper presented to the A. I. M. E. advocated the use of chemical analysis as well as physical testing to determine the character of steel required for specific uses.

1874 Joseph F. Glidden secured two patents on barbed wire. His patent of Nov. 24, No. 157,124 was considered an epoch making invention because of benefits to mankind. It has been publicly exhibited for many years in Washington, D. C.
J. F. Glidden and R. W. Vaughn devised machinery for rapid production of barbed wire.
Bell transmits first complete sentence over copper wire.
Up to this date in the U. S. only five patents on wire drawing granted. In this year 12 were granted.
Barbed wire produced in this year: five tons.

1875 First wire nails made in U. S. with a machine imported from Germany by Father Goebel, Covington, Ky.
Morgan develops his continuous mill.

1877 W. McCallip (Columbus, O.) improved the "repeater," doing away with manual help.

1878 Sir W. Siemens constructs the first electric furnace of any importance.
Three hundred patents granted for nail making machines in the U. S.
J. R. Ramsden developed an arrangement to harden and temper wire continuously.

1879 C. H. Morgan invents an automatic repeater.
Automatic reeling of wire rod used experimentally at the Washburn & Moen works. Use only horizontal rolls in the continuous mills (Bedson's had half vertical).
Morgan develops process of oil tempering wire for springs.

1880 Hughes first called attention to hydrogen embrittlement of iron wire on pickling.
The manufacture of square umbrella wire commenced at Cleveland, O.

1881 H. Roberts annealed wire in iron pots in a muffle furnace.
The import duty on wire rods in the U. S. was reduced from 1.2 cents to 0.3 cents per pound. Practically every wire rod mill had to close down.
H. Chisholm developed the practice of making a 4 inch billet from an ingot without reheating. In one heat he made from the four inch billet a No. 5 wire rod.

1882 H. Roberts invented the sloping floor of rod mills.
First Garrett rod rolling mill erected. He also adopted the power reel, which permitted finishing two rods simultaneously.

1883 Osmond announces transformation points in iron and steel.
The first steel cut nails made at Wheeling, W. Va.

1884 Woven wire fence first made by machinery by J. W. Page (Michigan).
John Hassall designed an improved nail machine.

1886 Sorby described microstructure of steel.
600,000 kegs (100 pounds each) of nails produced in U. S.
The Association of wire nail manufacturers prepared a standard wire nail card.

1887 Galvanized wire netting put on the U. S. market.

1888 In the U. S. operated 44 factories for barbed wire with 2190 machines. The requirement for wire at that time was 150,000 tons. Production of wire nails exceeded that of cut nails for first time.

1889 Eduard and Jos Louis Martin (Paris, France) patented a copper clad iron wire which was drawn.

1890 Heroult invented the electric arc furnace widely used today.

1891 Book "Wire, Its Manufacture and Uses" By J. Bucknall Smith published in England.
Carborundum discovered by E. G. Acheson.

1892 U. S. barbed wire production 200,000 tons; 4,719,524 nail kegs.
James Midgley succeeded in patenting music wire.

1895 The first staple-tie fencing made by Lamb Brothers in Michigan.
Morgan introduced his gravity discharge continuous billet heating furnace.
W. Holland, Jr. patented a method to heat wire uniformly by electric heating.
U. P. Wood writes: . . . "to thoroughly clean the surface to be coated is found to be the principal difficulty in the application of any electrochemical process for zinc."

1896 American field fence machine invented by A. J. Bates, Joliet, Ill.

1897 Great wire consolidation, the American Steel & Wire Co. being formed with a capital of $70,000,000.

1899 Ch. C. Baldwin obtained a patent according to which automatically adjusted speed of take up block was possible.

1900 Brinell invents his hardness tester.
Sherardizing of bolts, nails, etc. originated by Sherard Cowper-Coles.
The first Anthony woven fence made at Tecumseh, Mich.
American Steel & Wire produced 35,393 tons of woven wire fencing.

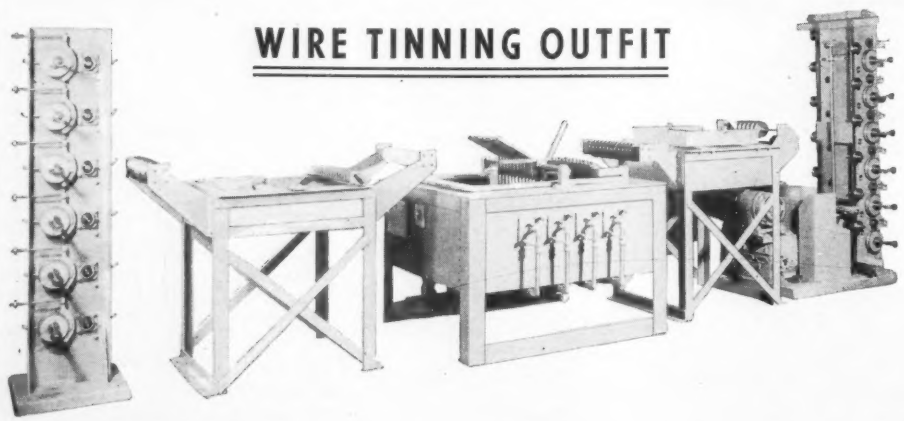
1905 American Steel & Wire produced 204,510 tons of woven wire fencing.

1910 American Steel & Wire produced 285,039 tons of woven wire fencing.

1914 The American Society for Testing Materials instituted an elaborate series of tests in different parts of the country to study resistance to corrosion of various materials.

1919 In England a machine was designed to salvage barbed wire from battle fields.

1929 J. A. Roebling Co. install largest universal testing machine for wire cable for strengths up to 2 million pounds.


**Wire Machines For**
Drawing, Enameling, Tinning, Spooling, Insulating with Glass, Asbestos, Paper Tape, Cotton, etc. Multiple Pull-outs, Rubber covered wire Panners, etc.

EST. 1855 AIMCO INC. 1918
"American" INSULATING MACHINERY COMPANY
REG. U.S. PAT. OFF.
517 West Huntingdon St.
PHILADELPHIA PENNSYLVANIA U.S.A.

# Volute Spring Research

By J. W. Rockefeller, Jr.,
All-Weather Springs,
New York, N. Y.

A digest of the December 1942 meeting of the Spring Research Committee of the American Society of Mechanical Engineers.

THE December 1942 meeting of the Spring Research Committee of the American Society of Mechanical Engineers was devoted to volute springs. Test work on this type of spring had been undertaken in 1942 on a scale probably never equalled before. These springs have some function in vehicular suspensions and several of the outstanding laboratories and proving grounds of the country concerned with suspension developments took part in various test programs. A large volume of the work was concerned with load carrying suspension springs; another part dealing with bumper springs. The progressive rate increase of the volute type of springs is the feature which in the past has constituted its chief appeal in bumper applications. When used as a suspension spring, it made possible at the same time a resilient load carrying member and a final shock cushioning device. The fact that the volute spring, by its very nature, operates under a rather complex stress pattern has lead to many discouraging results in the past and prevented its wider use for decades.

✦ ✦ ✦

PAPERS on volute springs were presented by **Mr. C. J. Holland,** President of the Holland Company, **Mr. H. O. Fuchs,** General Motors Corporation, and **Mr. Bernhard Sterne,** Experimental Engineer, Chrysler Corporation.

✦ ✦ ✦

MR. HOLLAND presented formulas derived for the computation of springs of the volute type. His paper dealt with volute springs hot wound under pressure so that adjacent coils came in contact. Such springs resist closure not only by elastic force, but in addition, by friction force in the spring. These frictional forces vary with the pressure between coils and with the hardness and roughness of the rubbing surfaces and are consequently variable. For this reason, friction is neglected in the formula and elastic forces only are considered. It is assumed that the bar section is a true rectangular one, not distorted by coiling and that the resultant load on the spring is axial. The fact that the coils are guided by each other as a telescope, one within the other, during compression justifies this assumption. The springs are coiled to excess free height and after heat treatment, this excess free height is removed by compressing under a load in excess of the springs rated capacity, the spring thus adjusting itself to a condition of uniform stress in the solid state. In order to satisfy this condition, the vertical pitch will vary from a maximum in the largest active coil to a minimum in the smallest active coil.

✦ ✦ ✦

THE formulas given in Mr. Holland's paper follow:

DEFLECTION (straight-line portion) in terms of load $P_x$, value $P_x$ not exceeding the capacity of the weakest coil $D_1$, equivalent to the capacity of a helical spring of rectangular-cross-section bar having a mean diameter equal to $D_1$ and a cross section of the bar equal to tb, is given by

$$f_x = \frac{P_x(D_1^4 - D_2^4)}{3.28Gbt^3p} \qquad (A)$$

✦ ✦ ✦

THE formula for deflection (straight-line portion) in terms of tensile stress gives the total deflection in terms of tensile stress for any stress up to that which will close the weakest coil $D_1$ solid.

$$f_{vs} = \frac{S_c(D_1^4 - D_2^4)}{7.2GtpD_1} \qquad (B)$$

✦ ✦ ✦

THE condition represented by Equations (A) and (B) is one in which there is a variable stress in the different coils of the volute springs; in other words, any load on a volute spring deflects the weaker coils more than it does the stronger coils, and therefore the weaker coils operate under a higher stress and through a greater stress range than do the stronger coils, for any load under which the entire spring remains active. The various coils are uniformly stressed only when the entire spring is solid.

TENSILE stress in terms of deflection, such that when all of the coils are closed solid each coil is uniformly stressed, is given by

$$S_c = \frac{f_{us} 5.40 G t p}{(D_1^3 - D_2^3)} \qquad (C)$$

✦ ✦ ✦

## Nomenclature

THE following nomenclature (dimensions given in inches and weights in pounds) is used in the Appendix:

**b—axial width, or height of cross section, which also equals actual solid height of spring.**

**f—deflection; fvs—deflection under variable stress; fus—deflection under uniform stress, viz., when entire spring is solid or bottomed.**

**fx—deflection under load Px.**

**h—solid slant height—assumed to equal tg x n.**

**n—number of active turns = $\frac{OD - (ID - 2tg)}{2\ tg}$**

**p—average horizontal pitch of turns = $\frac{(D_1 - D_2)\,tg}{2h}$ or $\frac{D_1 - D_2}{2n}$**

**t—thickness of cross section tb—rectangular shapes—assumed to equal 0.85 tg, which value will vary with coiling temperatures and pressures and/or clearance between turns.**

**tg—thickness of cross section plus gap or clearance between turns.**

**$D_1$—mean diameter of largest active turn = OD—1.5tg.**

**$D_2$—mean diameter of smallest active turn = ID—1.5 tg.**

**G—torsional modulus of elasticity = 10,600,000.**

**Px—any convenient load.**

**Sc—tensile stress in compression springs, psi.**

"NOTES on Secondary Stresses in Volute Springs" was the title of the paper presented by **Mr. H. O. Fuchs** of the General Motors Corporation.

✦ ✦ ✦

IN addition to torsion stresses which can be calculated from twisting moment and cross section, there are secondary stresses which appear in volute springs caused chiefly by the variation of twisting from section to section or by bending of the spring. They may reach high values in small diameter coils. Photographs of volute springs under pressure to which straight rods had been fastened in the unstressed condition showed clearly the variation in twisting. Three means were suggested for reduction of secondary stresses in volute springs:

1. **Stresses can be reduced by designing springs with fewer coils and larger inside diameters.**
2. **Load eccentricity can be reduced by supporting the heel of the section more firmly.**
3. **By coning the coiling mandrel in toward the small coils, it is possible to wind a volute spring with a desirable variable helix angle providing at the same time a small draft angle to facilitate removal of the spring from the mandrel.**

✦ ✦ ✦

MR. **Bernhard Sterne,** Experimental Engineer of the Chrysler Corporation presented a paper, "The Testing of Volute Springs". Table 1 gives the data on various life tests conducted with two volute spring types of similar design. In presenting these figures the author stated that no importance should be attached to the figures themselves, but only to the relative magnitude. Also, no comparison should be attempted between the two types of springs since they were manufactured of different materials. In order to bring out the apparent connection between short life and large settling on the one hand and a wide stress range in a long part of the blade (even at a comparatively low stress level) on the other hand, a column has been inserted with the number of coils in which the stress range during the test exceeds the (arbitrarily chosen) value of 60,000 lbs./in$^2$.

✦ ✦ ✦

THE study of the entire volute spring complex has been greatly stimulated by the activities of a special sub-committee which has been formed under the Spring Committee of the S.A.E. War Engineering Board. In this group, representatives of the makers and of the users of volute springs have united in a cooperative effort to find ways and means for the designing and building of better volute springs. Theoretical training and production experiences are being pooled in a wholehearted effort to serve the national interest. Research investigations of considerable scope have been started, and a manufacturing specification is being worked out for the large suspension springs which require the use of a high grade alloy steel such as NE 9262.

**TABLE 1**

**DATA ON VARIOUS LIFE TESTS CONDUCTED WITH TWO VOLUTE SPRING TYPES OF SIMILAR DESIGN**
**ENERGY INPUT 22,500 LBS.-IN. IN ALL TEST CYCLES**

| Springs with Blade Width | Test Stroke | Max. Height at Start of Test | Load Range during Test (Constant) | Location of Max. Stress | | Max. Stress | Max. Stress Range | Stress Range at Outer Heel | No. of Coils with Stress Range in Excess of 60,000 | Maximum | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Stress Diagram | Coil (from) outer heel) | | | | | Min. Life | Settling |
| in. | in. | in. | lbs. | Fig. | | lbs./in.$^2$ | lbs./in.$^2$ | lbs./in.$^2$ | Coils | Cycles | in. |
| 6⅞ | 2½ | 9⅝ | 5000-1700 | 6 | 3¼ | 147,000 | 105,000 | 21,000 | 2¾ | 111,000 | .08 |
| 6⅞ | 3⅝ | 11 | 1500-13500 | 7 | 2½ | 130,000 | 114,000 | 64,000 | 4½ | 63,000 | .41 |
| 6½ | 3¾ | 11½ | 1500-11000 | 8 | 1¼ | 129,000 | 114,000 | 90,000 | 4¼ | 64,000 | .36 |
| 6½ | 2⅝ | 10 | 5000-13500 | 9 | 1¾ | 143,000 | 90,000 | 42,000 | 3½ | 140,000 | .17 |
| 6½ | 1¾ | 8½ | 8500-21000 | 10 | 3 | 182,000 | 106,000 | 0 | 2¼ | 197,000 | .11 |

# Metal Working in Powder Metallurgy

By Claus G. Goetzel,

Works Manager, American Electro Metal Corporation, Yonkers, New York.

Published in Three Parts:

Part I—June, 1943, Plastic Deformation and Powder Metals.

Part II—July, 1943, Industrial Practices in The Sintered Refractory Metal Field.

## PART III

### Cold and Hot Working Experiments With Sintered Iron And Copper

COPPER and iron powders produced either from oxide reduction, or electrolytic deposition, were compacted at high pressure into ingots, 8½" x 2½", and sintered in hydrogen atmosphere in an electric furnace, the sintered bars were either cold rolled or hot forged to 25, 50 or 75 per cent thickness reduction, a brief anneal following each 25 per cent reduction. Thickness was reduced to nearly ¼" and then flat tensile bars were machined out of the plates.

FIGURES 6 and 7 represent physical properties of cold rolled and hot forged bars made from electrolytic powder and Figures 8 and 9 are for bars made from oxide-reduced powder. The properties of "as sintered" material were used for value of zero per cent reduction.

AFTER 75 per cent reduction of cold rolled electrolytic iron a maximum density of 7.74 grams per cubic centimeter (98 per cent of wrought iron, used for standard) is obtained, however, the tensile strength and elongation are below normal values. The theoretical density is closely approached by 50 per cent reduced hot-forged sinter iron having a value of 7.85, but both, tensile strength (42,000 pounds per square inch) and elongation (27 per cent) are low in comparison with values for soft wrought iron.

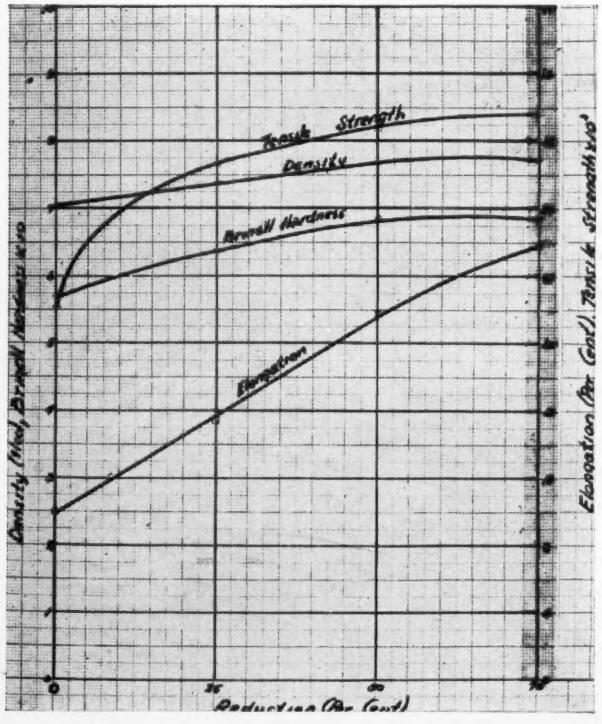



Fig. 6. Physical Properties vs. Degree of Cold Rolling Reduction for Sintered Iron.

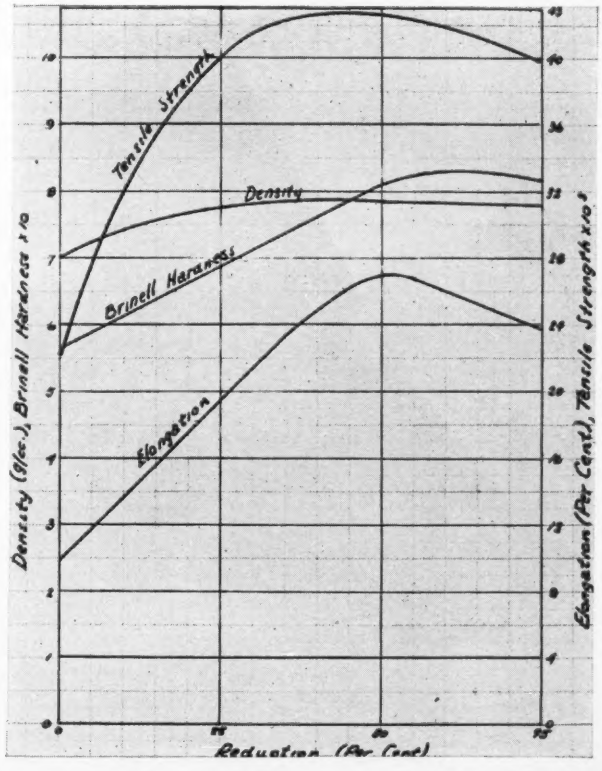



Fig. 7. Physical Properties vs. Degree of Hot Forging Reduction for Sintered Iron.

WITH greater degree of working the density values for hot and cold worked oxide-reduced iron approach asymptotically the normal values. The hardness values for forged material show a similar tendency to increase considerably after an initial hot deformation and then approach practically constant values of about 110 Brinell for 25 per cent or more reduction; the same trend is also noticed in values for the proportional limit, yield point, and ultimate strength. Comparable with carbon-free wrought iron, values of yield point and tensile strength averaging 38,000 and 50,000 pounds per square inch respectively, were obtained. However, the modulus of elasticity, never exceeding 90 per cent of standard, was evidently considerably below normal. Remaining short of standard but increased by hot forging are elongation and reduction in areas. The convex shape of the curves indicates a possibility that these ductility values can be brought close to normal if the forging reduction exceeds the 75 per cent limit of this investigation and if the material is completely released of all stresses by long-time intermediate anneals.

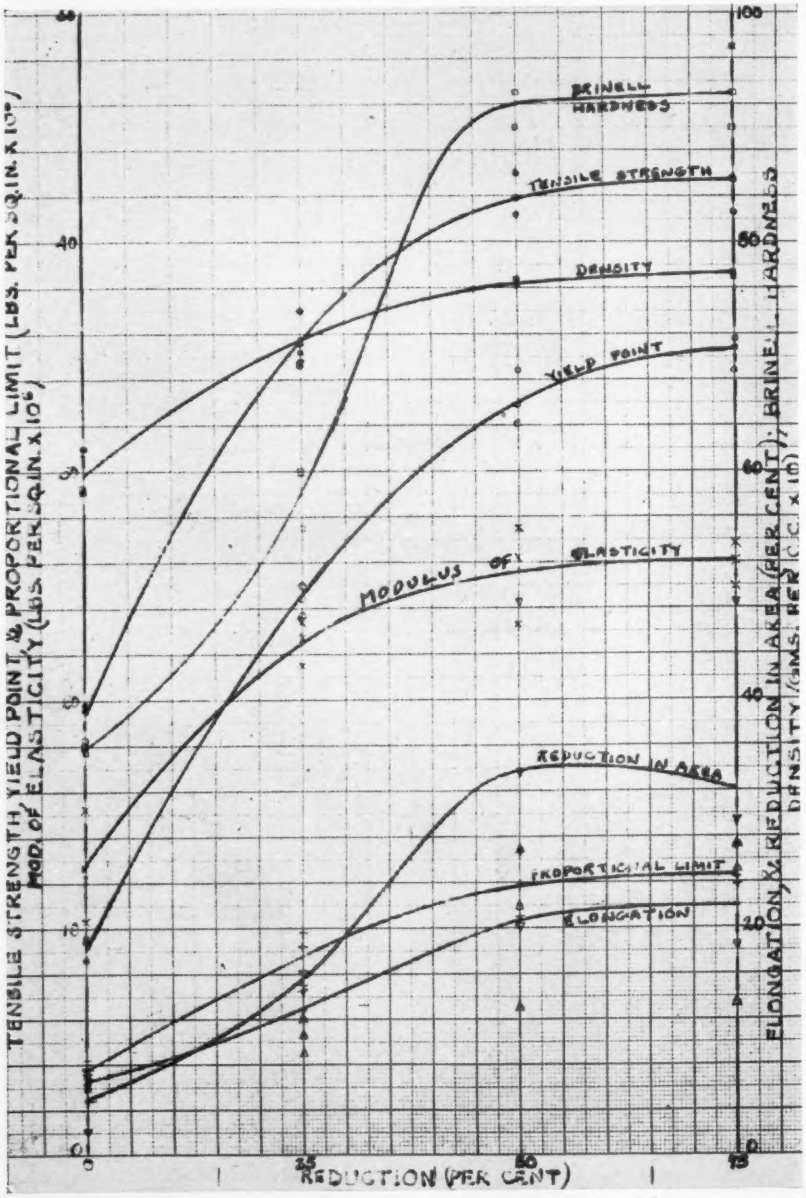

BRINELL HARDNESS
TENSILE STRENGTH
DENSITY
YIELD POINT
MODULUS OF ELASTICITY
REDUCTION IN AREA
PROPORTIONAL LIMIT
ELONGATION
TENSILE STRENGTH, YIELD POINT & PROPORTIONAL LIMIT (LBS. PER SQ. IN. X 10³)
MOD. OF ELASTICITY (LBS. PER SQ. IN. X 10⁶)
ELONGATION, % REDUCTION IN AREA (PER CENT); BRINELL HARDNESS
DENSITY (GMS. PER C.C. X 10)
REDUCTION (PER CENT)

Fig. 8. Physical Properties vs. Degree of Cold Rolling for Sintered Hydrogen-Reduced Iron.

✦ ✦ ✦

DENSITY and hardness increase is less marked for cold rolled and annealed material, maximum values not exceeding 43,000 pounds per square inch. The modulus of elasticity is nearly that of hot worked metal, but the maximum values of elongation and reduction in area are below the maxima of forged material.

✦ ✦ ✦

A SECTION of the metal reduced 75 per cent by cold working was tested without final annealing. Proof of severe deformation was found in values of 120 Brinell hardness, yield points averaging 50,000 pounds per square inch and ultimate strength to 63,000 pounds per square inch.

✦ ✦ ✦

IN similar experiments made with pieces formed from electrolytic copper powder, the same tendencies could be observed. The data for cold rolled and annealed copper is graphically presented in Figure 10, the data for hot-forged copper in Fig. 11. The density, hardness, tensile strength and elongation of cold rolled material rise continually to maxima at 75 per cent reduction, and slight increase is probable with additional reduction. Comparable with wrought metal are density of 8.81 (99 per cent of theoretical) and tensile strength of 32,700 pounds per square inch, but elongation of 27.5 per cent is still far below normal. It is probable that cold rolling is too unidirectional to give sufficient plastic deformation, necessary to close cavities, crack impurity films and condense the structure.

✦ ✦ ✦

THE tests on hot forged-sinter copper support these results. Even though the work was again applied in one direction, the plasticity of the metal was increased and densification and considerable improvement of physical properties

could be obtained at the lower percentage reduction. Values for density, hardness and elongation come even closer to those of ordinary metal, and are the highest so far known for sintered copper.

✦ ✦ ✦

OF high interest are the fracture structures as revealed by microscope studies. Distinct transcrystalline fracture are seen in all the hot forged and cold rolled and annealed bars. It was impossible, on the other hand, to define the fractures of non-worked sintered iron bars. The apparent lack of transcrystalline fractures even at high-power magnification indicates a predominantly intercrystalline fracture for the sintered iron compacts. Observations of structure fractures in sintered and worked copper bars support the above conclusions, except that the transcrystalline fractures are not always detectable in cold rolled bars.

✦ ✦ ✦

THE relative weakness of worked sinter metals may be attributed to the lack of complete grain structure refinement, pore closures and impurity film break-up, these requiring a specified density and work schedule. When working is done at high temperature it is extremely important to prevent oxidation, especially at the start of plastic deformation, when the structure is still distorted by an excess of microscopic pores and by grain boundaries contaminated with impurities.

✦ ✦ ✦

HOWEVER, the grain structure of a low-melting metal can be just so refined as a worked refractory metal. A previous publication in WIRE AND WIRE PRODUCTS (April and May 1941) reported results of wiremaking experiments with sintered copper, where fine wires, homogeneous and dense, were made. Values of physical properties were well within the range of data for ordinary wire; electrical conductivity 99 per cent of standard for hard-drawn wire and 100 per cent of standard for annealed wire, tensile strength

MAKE YOUR PLANS NOW TO ATTEND
THE WARTIME EMERGENCY ANNUAL CONVENTION
of
THE WIRE ASSOCIATION
LaSalle Hotel, October 18-22, 1943 Chicago, Illinois

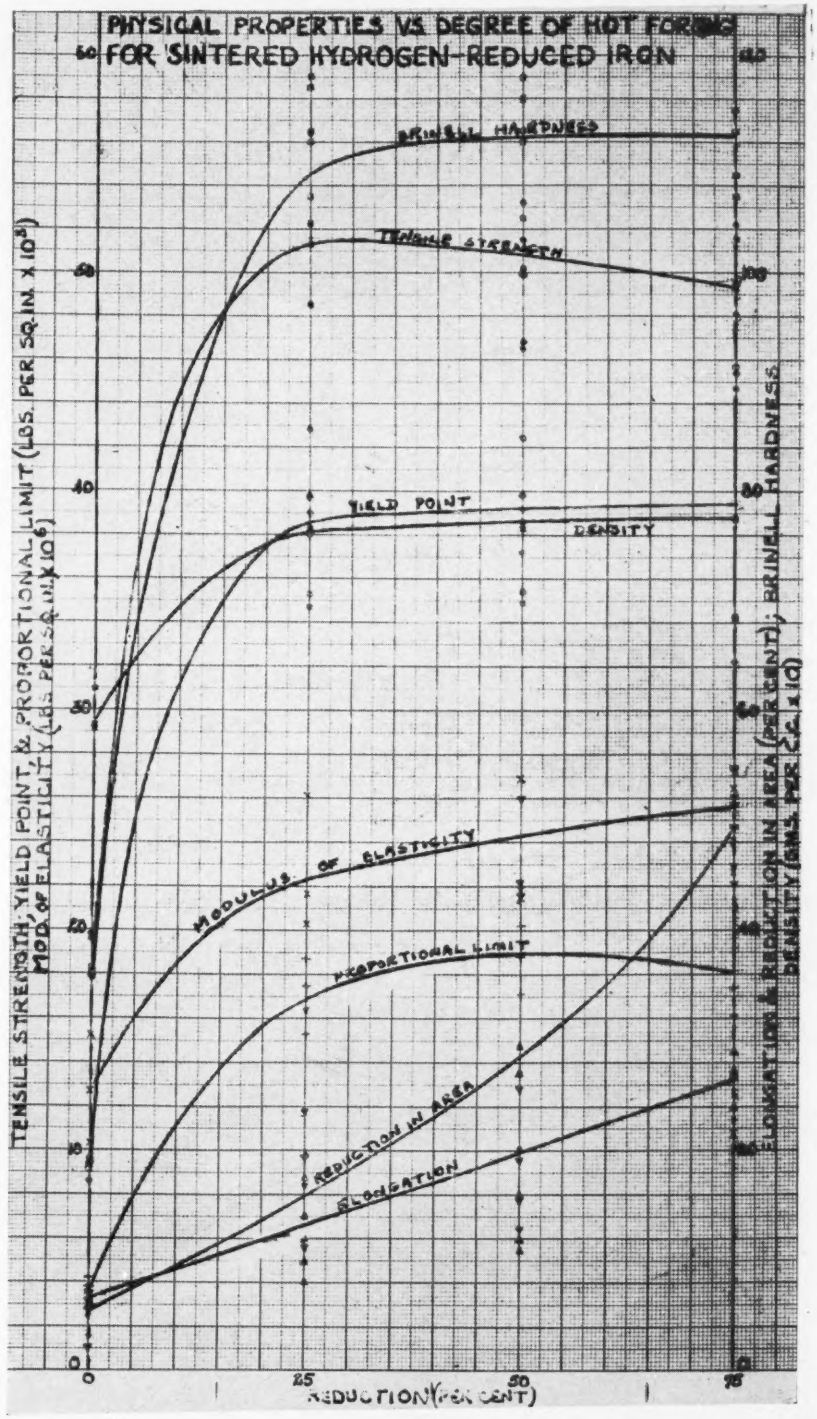



Fig. 9.

✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦

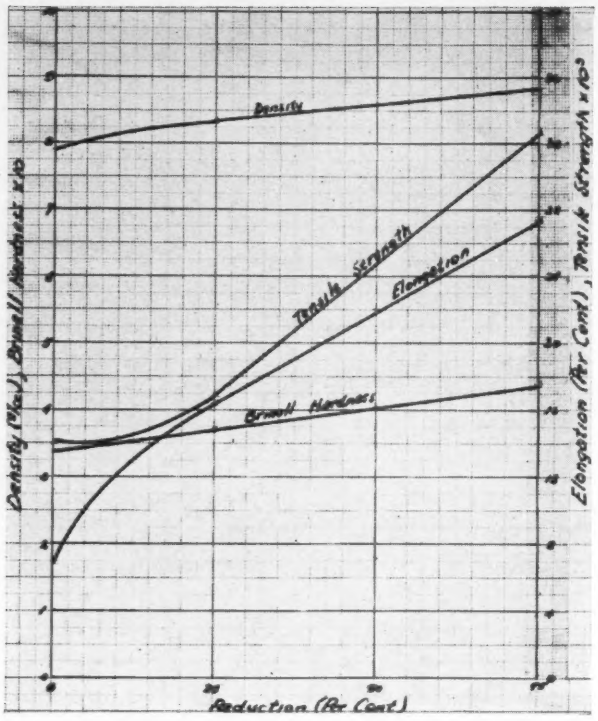



Fig. 10. Physical Properties vs. Degree of Cold Rolling Reduction for Sintered Copper.

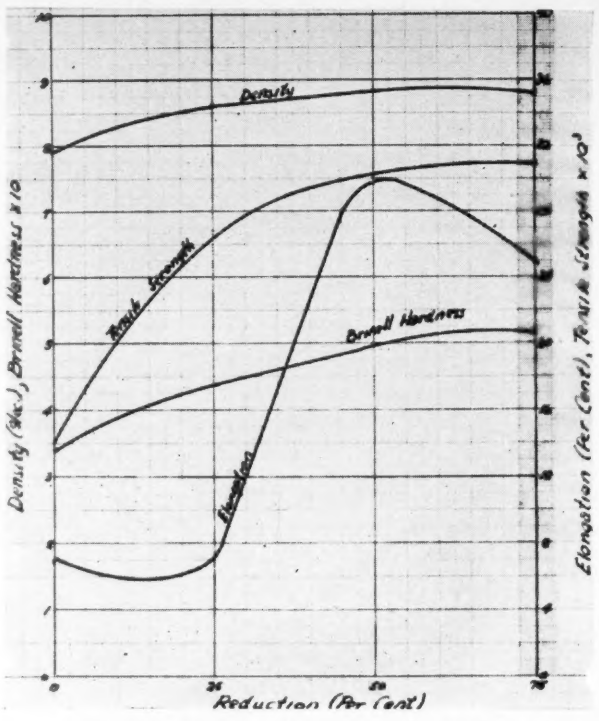



Fig. 11. Physical Properties vs. Degree of Hot Forging Reduction for Sintered Copper.

67,000 pounds per square inch at 5 per cent elongation for hard drawn wire and 38,000 pounds per square inch at 43 per cent elongation for soft wire.

THE encouraging results obtained with metal working of powder compacts, both, with refractory metals and with some lower-melting metals, will undoubtedly lead to further advancement of the powder metallurgy technique, enlarging the scope of work for this particular branch of engineering.

# METAL INDUSTRY WILL MEET IN CHICAGO

## Plans Announced For National Metal Congress

PLANS for the 25th annual National Metal Congress in Chicago the week of October 18, were announced today by **W. H. Eisenman,** managing director of the meeting and national secretary of the American Society for Metals.

✦ ✦ ✦

WITH completion of final arrangements for a War Conference Display as one of the outstanding features of this meeting of the metal industry, Mr. Eisenman pointed out that all activities would be concentrated in the Palmer House and other Chicago hotels.

"THE entire Metal Congress and Conference Displays will be tuned to the increase of war production in the metal industry, to the conservation of metals and to postwar planning", Mr. Eisenman said. "All technical sessions and special daily War Production and Conservation sessions will be streamlined and comprehensive in their contributions to the war problems and will contribute decisively and materially to the shortening of the war.

✦ ✦ ✦

"DURING the past year", Mr. Eisenman continued, "the metal industry has largely finished its plant expansion job for war and today it is confronted with production problems involving shortages of many strategic metals, more efficient use of equipment, and continued training of personnel. All of these problems will be dealt with at sessions of the Congress.

✦ ✦ ✦

"THEN, too, many companies have completed their war contracts or are forced by changes in war planning to go into new markets or obtain new contracts, and the War Conference Displays will meet these problems. New

(*Please turn to Page 484*)

# ADVERTISING and OCTOBER

1943 is the crucial year in the history of democracy. This year so far as making things decisive, we either do or we don't.

On the Home Front the Wire Industry is doing its best, and that best is damned good! To further advance our knowledge of wire production processes and techniques, the Wartime Emergency Convention of the Wire Association in October has been planned to provide a general forum for the dissemination of vital and timely information that will help wire men serve their country even more efficiently. It is a Convention you can't afford to miss and we want to see you there.

***The October WIRE & WIRE PRODUCTS plays an important part in the Convention. It carries preprints of the technical papers, a program of the sessions and other valuable features, which include the special advertising carried for the Convention.***

Manufacturers of wire, machinery, equipment and supplies used by the wire mills and wire products fabricators should all be represented in this great October Issue. Many space reservations have already been received. Due to the paper shortage and to short-handed printing conditions, we ask that all other orders for October advertising be sent in immediately, so we can provide for your space requirements.

***The Convention Issue gives your advertising added attention value, extra circulation, longer life and identity with a great cause—The contribution of the Wire Industry to victory over the Axis blight. Your advertising makes possible the invaluable editorial services rendered to the Industry by WIRE & WIRE PRODUCTS. But, in turn, you are given an opportunity to place your name and products or services before the Industry in a manner that pays.***

Please send your order today. Your cooperation will help and be greatly appreciated.

## WIRE & WIRE PRODUCTS

**300 Main Street • Stamford, Conn.**

***Official Publication of the Wire Association***

# ✦ GOVERNMENT WIRE PRODUCTION INFORMATION ✦

### Wire and Cable

CLARIFYING the reference to rated orders for wire and cable contained in Release TCS-226, issued June 30 in the Trade Press Clip Sheet, concerning a meeting of the Electrical Wholesale Distributors Industry Advisory Committee, the Copper Division issued the following statement:

✦ ✦ ✦

"ALL direct shipment orders placed on wire mills by warehouses which bear only preference ratings were automatically cancelled by the wire mills when the Controlled Materials Plan became effective July 1. However, electrical warehouses may ship on both authorized controlled material orders and preference rated orders under the provisions of CMP Regulation No. 4, providing shipment is made from warehouse stock."

### Steel Scrap

ALL compliance powers available to the War Production Board will be used to enforce its order requiring the segregation of alloy steel scrap, which was reissued with revised categories covering recently-developed alloy steels and iron under Supplementary Order M-24-c, July 6, 1943.

✦ ✦ ✦

STEEL Division officials pointed out that the country's stocks of virgin alloying metals are being rapidly depleted, and that a considerable tonnage of valuable alloys which could supplement new supplies is being dissipated because of improper segregation and identification of scrap.

✦ ✦ ✦

ORDER M-24-c, which requires the segregation of alloy scrap, has been in effect for about a year, but many producers, dealers, and steel mills have failed to fully comply with the order. Much of the available alloy steel scrap—containing invaluable elements such as nickel, molybdenum and chromium—is not finding its way back to the furnaces as alloy scrap.

✦ ✦ ✦

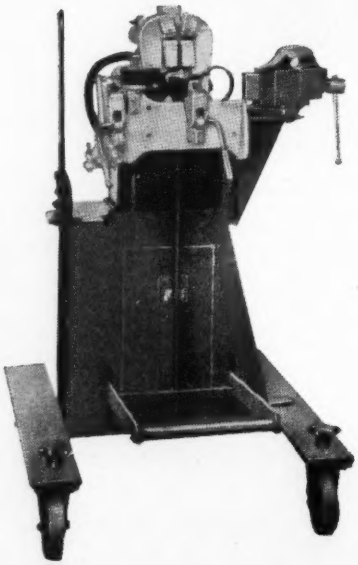
THE re-issued order's revised classifications, it is expected, will make segregation easier, and if conscientiously adhered to, will add a large supply of alloys for use in steel production. Letters sent by the Steel Division to producers of iron and steel, to users, and to scrap dealers urge the fullest co-operation to prevent the necessity of large-scale compliance actions by WPB.


MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

CONTINUOUS IMPROVEMENT

MICRO-WELDERS with dial indicating annealing attachments are now available for high carbon wire.

There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.



MICRO PRODUCTS COMPANY
20 NORTH WACKER DRIVE, CHICAGO, ILL.
Telephone, State 7468

STEEL mills and foundries have also been asked to initiate at once a continuing survey of receipts of scrap, particularly carbon and alloy turnings, and to report any incorrectly classified receipts including the car number, shipper, date, and analysis to the Scrap Section of the Steel Division.

✦ ✦ ✦

IN addition to providing for the proper segregation of the various types of alloy scrap, the revised M-24-c specifically prohibits the use of any type of scrap listed in the melting of any but alloy steel or iron.

✦ ✦ ✦

### Electrical Conduit Restrictions

ADDITIONAL restrictions on the manufacture and installation of rigid electrical conduit, electrical metallic tubing, flexible metal conduit or tubing, and raceways are imposed by Limitation Order L-225 as amended by the War Production Board. The amended order effects further savings in steel.

✦ ✦ ✦

MANUFACTURE of electrical metallic tubing (commonly known as thin wall conduit) is limited to 75 per cent of 1941 production and manufacture of flexible metal conduit or tubing is limited to 50 per cent of 1941 production by the following provisions of the amended order; metal used in the manufacture of thin wall conduit during any month is restricted to 1/16 of the total weight of metal used during 1941, and metal used in the manufacture of flexible metal conduit during any month is restricted to 1/24 of the total weight of metal used during 1941.

✦ ✦ ✦

LIMITATIONS on the use of metal in rigid electrical conduit—commonly known as heavy wall conduit—and in raceways, as established in the original order issued in December 1942, remain unchanged; in any calendar quarter metal used in the manufacture of heavy wall conduit and in raceways is restricted to 1/10 and 1/8

(*Please turn to Page 464*)


STANDARD
INDUSTRIAL COMPOUNDS

ARE MADE TO ORDER

Research and practical experience are essential to facilitate production, lower operating costs, and improve quality of product.

Our practical experience and laboratory facilities are at your disposal to serve you to this end. Variation from standard lubricants are sometimes required to attain the maximum of efficiency in speed, die life, and finish.

Wire drawing compounds must provide film strength, complete adherence, and elongate with the wire to the finished size to prevent raw dry spots or scratched surfaces of the steel.

Our service men will gladly demonstrate our products.

Listed below are a few of our standard lubricants, others are listed in the previous issue.

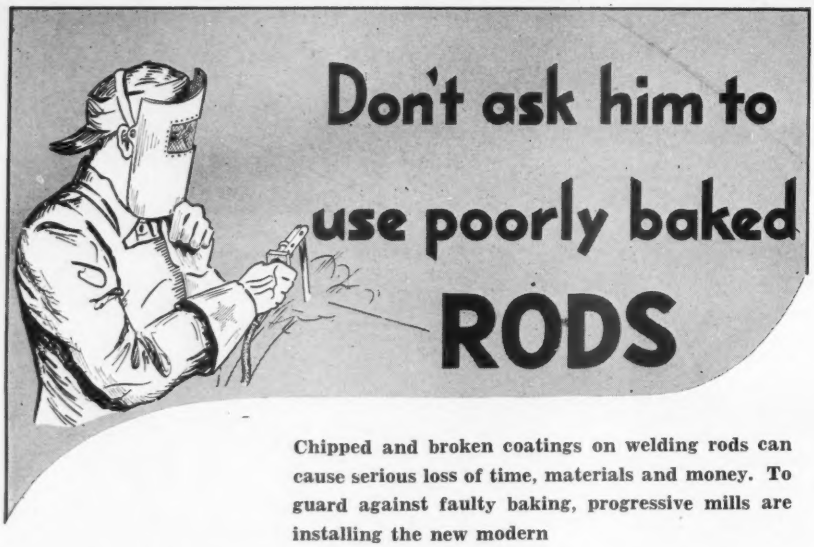
**#60**
For drawing low and high carbon wire dry on intermediate machines or bench.

**#105**
For bright wire two or three drafts leaves clean bright finish.

**#80**
For drawing one hole wire for cold heading finish.

**#24**
For coating wire where special finish is required without lime. Precoating before lime on wet drawing.

STANDARD INDUSTRIAL COMPOUNDS COMPANY
4600 FERDINAND STREET SIC CHICAGO • ILLINOIS




Chipped and broken coatings on welding rods can cause serious loss of time, materials and money. To guard against faulty baking, progressive mills are installing the new modern

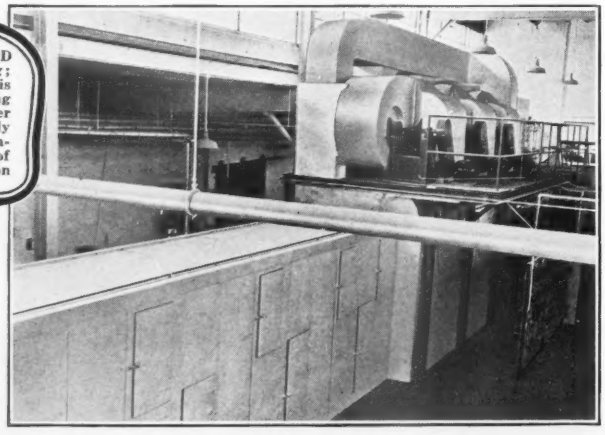
# ROSS WELDING ROD OVENS

The increasing demand for welding rods has emphasized the importance of the oven used for baking. Ross Multiple Pass, Zone-Controlled, Chain Conveyor Ovens are now standard equipment in the plants of leading rod makers. Ross Ovens handle the rods so as to protect the coatings while they are soft and to apply the heat in different zones without changing the rods from one oven to another.

Constant high quantity production of hard, firm, dry coated rods is the result of uniform control of air temperatures and circulation maintained in Ross Ovens. Special means are provided for varying the conditions in various zones according to type of rods being handled. Investigate the many operating advantages of baking with Ross Ovens!. Figure the savings in time, material and money.

Write us for additional detailed information. No obligation.

ROSS WELDING ROD OVEN. 135 ft. long; 5-pass; 3 zone. This oven is now producing up to 1200 rods per minute. This can only be accomplished by reason of uniformity of control and distribution of heat.



ROSS SYSTEMS

J. O. ROSS ENGINEERING CORP.

350 MADISON AVE., New York, N. Y.

CHICAGO • MONTREAL • DETROIT


## Government Wire Production Information

(*Continued from Page 463*)

respectively of the total weight of metal used for these items in 1941.

✦ ✦ ✦

## Steel Shoe Wire Direction

THE following direction was issued pursuant to § 3175.5 CMP Regulation No. 5 as of June 26th.

✦ ✦ ✦

STEEL wire used in making footwear shall be treated as an operating supply under CMP Regulation No. 5 regardless of whether, under the particular manufacturer's accounting practice, such steel wire is charged to operating expenses. Accordingly, manufacturers of footwear should obtain steel wire in the manner provided in CMP Regulation No. 5 and should not file applications for allotments of it. This applies to steel toe lasting wire, steel staple wire, steel grip tacker wire, steel slugging wire, steel taper nail wire and steel wire used for similar purposes.

✦ ✦ ✦

## Copper Scrap

A UNIFORM limit to the fees and charges which may be made for conversion of copper scrap and copper alloy scrap in toll transactions was announced recently by the Office of Price Administration.

✦ ✦ ✦

CHARGES for processing, treating, handling and other services performed in toll conversions henceforth may be no larger than the difference between the maximum price for the scrap metal and the ceiling price for refined copper.

✦ ✦ ✦

THE new ceiling on toll charges is established in Amendment No. 2 to Maximum Price Regulation No. 20 (Copper Scrap and Copper Alloy Scrap), and became effective July 14, 1943.

✦ ✦ ✦

PREVIOUSLY toll transactions were covered by the General Maximum Price Regulation, which established highest charges made

by smelters in toll transactions during the month of March, 1942, as maximum charges.

✦ ✦ ✦

TOLL agreements most common in industry practice today are transactions in which owners of copper scrap or copper alloy scrap turn the metal over to a smelter, refiner, or other processor for conversion into refined copper metal to be returned to the owners.

✦ ✦ ✦

### Welding Rod Direction

THE following direction was issued pursuant to CMP Regulation No. 5 (§ 3175.5), as of June 26th:

✦ ✦ ✦

WELDING rod (arc welding electrodes and gas welding rod) used for manufacturing purposes may not be treated as an operating supply under CMP Regulation No. 5 even though it is carried as an operating supply under established accounting practice.

✦ ✦ ✦

A MANUFACTURER may use the rating assigned to him by CMP Regulation No. 5 to get his requirements of welding rod for repairing his own equipment. He may not use the rating to get his requirements of welding rod for welding operations in the course of producing his product.

✦ ✦ ✦

### Ruling On Deliveries of Wire Products Modified By W.P.B.

UNDER Order M-21-b-2 as amended June 15th, a steel producer may in any month within the limits of his production directive for certain wire and sheet products, make delivery of these products to warehouses on orders which are not authorized controlled material orders after he has filled all authorized controlled material orders for the same product group calling for delivery in the same month.

✦ ✦ ✦

IT has now been brought to the attention of the W.P.B. Steel Division, that these orders are not

(*Please turn to Page 466*)


# Landing Fields in a Hurry

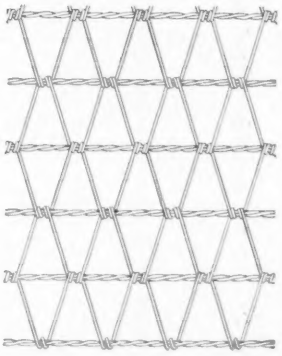
**with the help of**

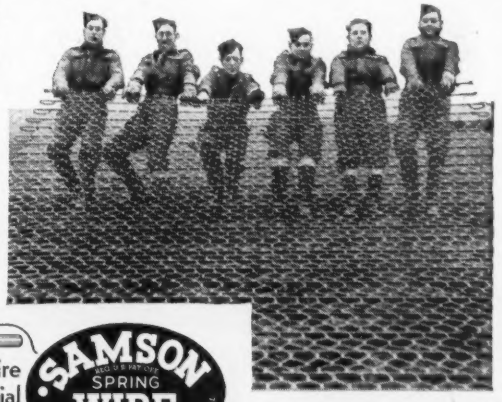
# KEYSTONE Wire

Many advance bases near our fighting fronts are equipped with spot airplane runways in a hurry. Rolls of ready woven and reinforced fabric are quickly unrolled and anchored down. In a mere matter of hours satisfactory landing fields are thus created.

Here is a combat advantage wherein wire mill production plays a major hand. Keystone is supplying many miles of wire fabric for this use—as well as thousands of items to help equip planes, tanks, ships, and guns. Each day of this production brings us that much nearer Victory—when wire and wire mill products will again be rolling . . . to meet a pent up *civilian* demand.

One of thousands of wire mill products for war uses.





British "Tommies" laying chicken-mesh landing mat.

**KEYSTONE STEEL & WIRE CO.**
**PEORIA, ILLINOIS**

Special Analysis Wire for All Industrial Uses

SAMSON SPRING WIRE
KEYSTONE STEEL & WIRE CO. PEORIA, ILL.

Ask for this book

Tells you how to take care of small tools-Bolt Clippers, Files, Taps, Drills, etc. The boiled down facts to help you get the most out of these tools-use, wear, repair and selection. Handy pocket size. Just ask on a post card for-Porter's Tool Maintenance Book it's FREE

REG. U. S. HKP PAT. OFF.

PORTER CUTTERS

BOLT CLIPPERS — AUTOBODY REPAIR TOOLS — PRUNERS

H. K. PORTER, INC., 414 ASHLAND ST., EVERETT, MASS.


## Government Wire Production Information

(*Continued from Page 465*)

in all cases being listed on the daily order report submitted to W.P.B. As these tabulations are intended to show the order loads on the mills by months for all controlled steel products, it is evident that this order load will not include all tonnage placed with producers on the above basis and accordingly is incorrect to that extent, W.P.B. reveals.

✦ ✦ ✦

THE products listed are: Galvanized or painted formed roofing and siding; wire bale ties; wire (barbed and twisted), wire fence (woven or welded), and netting; fence posts and gates.

✦ ✦ ✦

ALL orders received for the above products, W.P.B. has instructed, should be included on the daily order report and given the symbol "WH" and tonnage distributed 1/3 to each of the first three months following the month in which the order is accepted. The instruction is retroactive and steel producers are requested to include on their next daily order reports the orders accepted in the above category which have not been previously reported.

✦ ✦ ✦

## Copper Wire

COPPER wire and cable in distributors' stocks are no longer subject to inventory restrictions of Order L-63 (suppliers inventory limitation), the War Production Board ruled recently in amending the order.

✦ ✦ ✦

THE exemption covers any "bare or insulated wire or cable for electrical conduction made from copper or copper base alloy."

✦ ✦ ✦

AS a result of the action, suppliers are not limited in the amount of copper wire and cable they may purchase, but sales of such materials cannot be included in their computations of maximum permissible inventories as determined by L-63.

# STATISTICS - - MAY, 1943

## CAPACITY AND PRODUCTION FOR SALE OF IRON AND STEEL PRODUCTS

**(For May, 1943)**

**As reported by American Iron and Steel Institute**

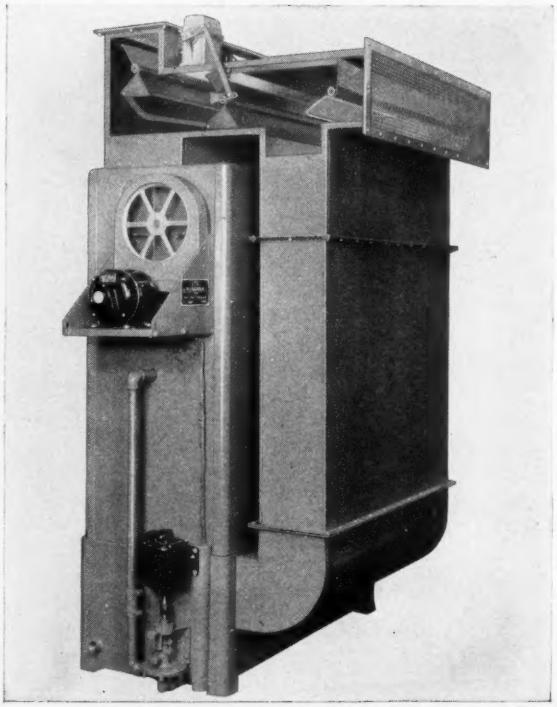
| Steel Products | Number of companies | Items | Annual Capacity Net tons | Production for Sale—Net Tons | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Current Month | | | | Year to Date | | | |
| | | | | | | Shipments | | | | Shipments | |
| | | | | Total | Per Cent of capacity | Export | To members of the industry for conversion into further finished products | Total | Per Cent of capacity | Export | To members of the industry for conversion into further finished products |
| Wire rods | 21 | 25 | ..... | 99,037 | ... | ... | 16,792 | 495,605 | ... | ..... | 99,167 |
| Wire—Drawn | 41 | 26 | 2,366,150 | 158,073 | 78.6 | ... | 4,982 | 814,614 | 83.2 | ... | 23,190 |
| Nails and staples | 19 | 27 | 1,116,640 | 67,442 | 71.1 | ..... | ..... | 357,021 | 77.3 | ..... | ..... |
| Barbed and twisted | 15 | 28 | 482,280 | 21,831 | 53.3 | ..... | ... | 101,025 | 50.6 | ..... | ..... |
| Woven wire fence | 16 | 29 | 778,060 | 20,202 | 30.6 | ... | ..... | 84,952 | 26.4 | ..... | ..... |
| Bale ties | 12 | 30 | 128,420 | 9,745 | 89.3 | ..... | ..... | 45,081 | 84.8 | ..... | ..... |
| All other wire products | 8 | 31 | 78,220 | 4,894 | 73.6 | ... | ..... | 26,049 | 80.5 | ..... | ..... |
| Fence posts | 11 | 32 | 125,065 | 2,253 | 21.2 | ... | ... | 8,975 | 17.3 | ..... | ..... |

HOWEVER, it was pointed out that deliveries of copper wire and cable from warehouses are subject to Controlled Materials Plan Regulation No. 4. Replacements of these inventories are made in accordance with instructions or directives sent directly to warehouses by WPB. In view of these controls, L-63 restrictions on wire and cable inventories were found to be no longer necessary.

✦ ✦ ✦

### American Steel & Wire Plans Modernization of Donora Steel & Wire Works

THE American Steel & Wire Company, a subsidiary of the U. S. Steel Corporation, has plans in progress for modernization and expansion of facilities at the plant of the Donora Steel & Wire Works. Plans include major improvements to its harbor in the Monongahela River, comprising a one-mile encroachment riverward.

U. S. Patent No. 2,296,946 and No. 2,321,933

**CUT OPERATING COSTS**

***of Dependable Water Cooling***

● The NIAGARA AERO HEAT EXCHANGER is a water-saver, employing the evaporative cooling principle to maintain ideal temperature requirements, holding temperatures uniform by dependable and constant control. It is successfully used by wire manufacturers to cool water, oils, wire drawing compounds, providing dependable temperature control for wire drawing regardless of high temperature of available water or scarcity of water supply. In addition to saving water, it saves the piping and pumping of large water systems, and the maintenance, cleaning and replacement of piping. It provides a closed system, keeping liquids free from contamination and provides for heating when necessary to raise temperatures.

Write for Niagara Bulletins 90 and 94—and information on users' experiences. Address Dept. WP-83

**NIAGARA BLOWER COMPANY**

General Sales Office: 6 E. 45th Street, New York 17, N. Y.

461 Statler Office Bldg., Boston
673 Ontario St., Buffalo
37 W. Van Buren St., Chicago
648 Hanna Bldg., Cleveland
2832 E. Grand Blvd., Detroit
Room 1222, Commercial Trust Bldg., Philadelphia
Fourth & Cherry Bldg., Seattle

*District Engineers in Principal Cities*

**NIAGARA** INDUSTRIAL COOLING • HEATING • DRYING HUMIDIFYING • AIR ENGINEERING EQUIPMENT

## Getting to the Roots of Absenteeism

(*Continued from Page 448*)

WHATEVER the source of illness, it is a serious cause of lost time, and many plants are attacking it through their medical and first aid departments primarily set up to control industrial accidents and disease. Following a widespread survey, the National Association of Manufacturers credits adequate plant medical programs for a 30 percent drop in absenteeism.

✦ ✦ ✦

FOOD habits are also important to health. Many plants have long operated cafeterias under trained dieticians and have provided nutritious meals at cost. Others have supplemented workers' lunch boxes with rolling cars supplied with milk, citrus fruits, and enriched breads or pastries. At least 30 minutes in which to eat the meal and get away from the bench definitely increases productivity.

✦ ✦ ✦

TRANSPORTATION difficulties are also an important source of absenteeism accounting for 31.7 percent of the absence in Revere Copper and Brass, Inc., Rome, New York, in a recent 6 weeks' period. To meet such difficulties, the General Cable Corporation, like several other companies, has engaged transportation personnel "to handle all problems of absenteeism having to do with current transportation adjustments."

✦ ✦ ✦

MANAGEMENT can often secure community cooperation in attacking causes of absenteeism. For example, many plants have arranged with stores to remain open during leisure hours of workers on various shifts and to hold back some food for sale when the workers begin to shop. **J. E. Walters,** of Revere Copper and Brass, says he believes "that the commercial establishments should go on a war basis, just the same as the war plants . . . And unless they do, our people are going to be absent . . . And if they do, a lot of our absenteesim will vanish. It is not especially absenteeism among women, because men like to get away too. They have to go to the bank, because men take care of the money, as a rule . . . They have to get their hair cut, and have to do other things."

✦ ✦ ✦

COMPANIES have also found that shop stewards, union officials, and labor-management committees are invaluable in helping to reduce absenteeism when their cooperation is properly enlisted. They can help in ferreting out causes, can recommend ways of eliminating them, and can effectively help in disciplining people who are frequently absent without good excuse. Mr. Day of the Chain Belt Company says, "We then plan to turn the names of the individuals who are frequently absenting


ROBINSON TUBE-TYPE WIRE STRANDERS

COMPLETELY REDESIGNED!

Sage engineering . . . Sound construction . . . and the knowledge gained through the exchange of ideas with customers . . . All are embodied in the advanced design and superior operation of the new improved Robinson Wire Strander. Full information available upon inquiry!

ROBINSON MANUFACTURING COMPANY
WORKS — MUNCY, PENNA.

*Sales Representatives*

MERCER-ROBINSON CO., INC., 30 CHURCH ST., NEW YORK

UNIQUE

themselves from work to the War Production Drive Committee, and have them talk to these individuals. We feel that the result from this will be that the men will not like to go before a committee of fellow workers and try to explain these unexcused absences, and will think twice before they take off again." Mr. Heiny of the General Cable Corporation reports that the labor-management committees in that plant are studying the problem of absenteeism.

✦ ✦ ✦

TO measure the success of such efforts, records, of course, are essential, but they need not be elaborate. Most firms keep time cards of days worked. Cards not punched, for employees scheduled to work, show absenteeism. A simple count of these unpunched cards will show the number of employees absent by plant, department, shift, day, and usually sex. Absentee rates can then be determined by this formula, which the Bureau of Labor Statistics suggests in order to have a common and comparable basis for measuring absenteeism in various plants:

$$\text{Absenteeism} = \frac{\text{Man days lost}}{\text{Man days worked plus man days lost.}}$$

✦ ✦ ✦

ACCORDING to this formula, the average absenteeism rate in manufacturing industries surveyed by the Bureau of Labor Statistics was 5.4 percent in March 1943. This is a preliminary estimate based on reports from almost 3,000 establishments employing over 1½ million workers in industries important to munitions production. Nobody really knows what "normal" absenteeism is or should be. A curbstone estimate has placed it at 2 or 3 percent. These rates may serve, perhaps, as a yardstick for comparing absentee rates in individual plants. Where the rates are high, management has the responsibility for getting at basic causes and eliminating them.

## Wire-Bound Boxes for Gas Masks

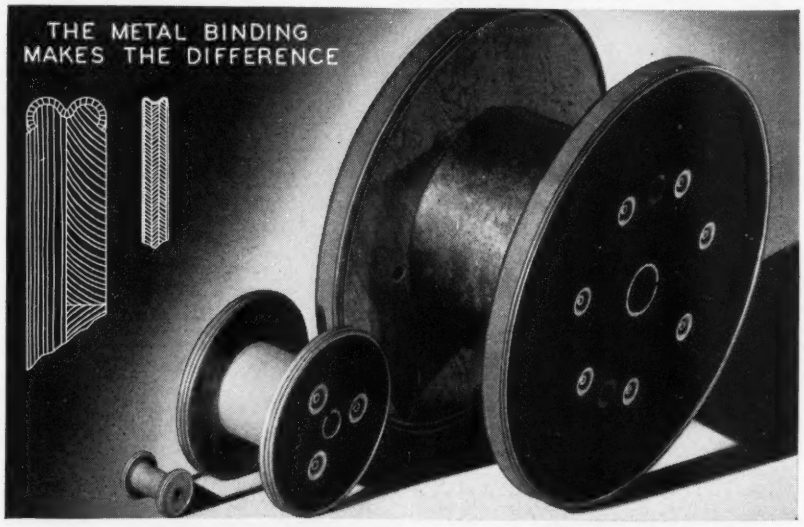
THE Chemical Warfare Service has recently adopted a wire-bound box for use in the packing and shipping of gas masks. The new type container replaces the old nailed box and effects appreciable savings in various critical materials.

✦ ✦ ✦

IN addition to a 5 per cent saving in initial cost, the wire-bound box requires seven feet less lumber and about one-tenth of a pound less metal per unit. Laboratory tests prove it to be approximately three times as strong as the nailed box; it can be produced at a much more rapid rate and there is practically no waste lumber.

✦ ✦ ✦

OTHER advantages include less storage space required, three sections instead of the six in the old nailed box and less labor necessary for handling. Savings in lumber amount to approximately 340 carloads per million boxes, and packing time is materially reduced.


*Serve Yourself and Your Customers* **BETTER**

**With HUBBARD Metal Bound Shipping Spools and Reels**

With wood for lightness combined by a patented process with steel for strength, Hubbard spools and reels have the stamina to withstand the roughest handling. Where breaking, warping, and splintering might occur, there the die formed steel protects the wood.

Such construction means long run economy. You'll be buying spools and reels less often. Both you and your customers will be guarded against needless breakage losses. You'll find that employees like to work with Hubbard spools and reels, since there are no jagged rough edges to cut hands and tear clothing.

Serve yourself and your customers better by switching to these true running, stronger carriers for all types of wire. They are modern in design and moderate in price. Write for full details.

**HUBBARD SPOOL COMPANY**

1624 CARROLL AVENUE | CHICAGO, ILLINOIS

*Since 1912, manufacturers of wire drawing and annealing, and shipping spools and reels.*

# Automatic Tension Control

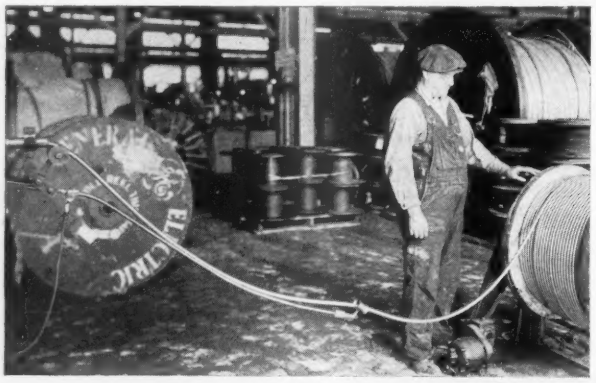
By M. A. KELAFANT,
Schenectady Works,
General Electric Company

IN the manufacture of single-conductor oil-filled cable, the core for the conductor is made from small rectangular steel strip formed into a continuous tube similar to a spring. Necessarily, if much tension is applied to this open spiralled tube when winding to or from a reel, the diameter and length are affected.

✦ ✦ ✦

IN order to exert the minimum tension on the spiral as it is pulled off the reel and through the stranding machine, a simple but effective tension control was developed.

THIS control consists of a ¼-hp motor connected by a chain-drive to the shaft holding the supply-reel containing the spiral. The electrical device for actuating the motor consists of a mercury switch mounted on a lever which rests on the spiral as it passes from the reel to the strander. The mercury switch is set so that there is at all times a sag in the spiral.



✦ ✦ ✦

WHEN the sag reaches a given high point the mercury switch actuates the motor, which in turn drives the supply reel ahead, thereby paying off the spiral. When the sag in the spiral reaches the low point, the motor stops and the supply reel remains stationary until the high point of sag is reached, when the cycle is repeated.


## ANNUAL MEDAL AWARD of the WIRE ASSOCIATION

FOR THE MOST MERITORIOUS PAPER ON WIRE MANUFACTURE OR FABRICATION

DURING THE YEAR

## BY A MEMBER OF THE WIRE ASSOCIATION

✦ ✦ ✦

ALL members of the Wire Association are cordially invited to submit technical papers either for publication in "WIRE & WIRE PRODUCTS" during the year or for presentation before the Annual Wire Association Convention.

✦ ✦ ✦

AN annual medal will be awarded in each of the two major divisions of the activities of the Association, to the papers coming nearest to the requirement set forth above.

✦ ✦ ✦

CONSIDERATION for the Medal Awards is not limited to the papers presented at the Annual Meeting, but is given to all papers submitted by members and published in "WIRE & WIRE PRODUCTS" during the year.

✦ ✦ ✦

ADDITIONAL information may be obtained by addressing:

✦ ✦ ✦

SELECTION of papers to be presented at the Annual Convention rests in the hands of the Joint Program Committee and the Board of Directors of the Wire Association.

✦ ✦ ✦

ALL papers submitted become the property of the Wire Association and the Board of Directors constitutes the Committee on Awards.

✦ ✦ ✦

RICHARD E. BROWN,

SECRETARY, THE WIRE ASSOCIATION

300 MAIN STREET STAMFORD, CONNECTICUT

## The Service Behavior of Plated Steel Wire As Indicated by the Corrosion Fatigue Test

(*Continued from Page 450*)

of development. Hence the ease with which the wire could be broken up with the fingers.

✦ ✦ ✦

COPPER is more "noble" than steel; therefore, in the case of corrosion-fatigue tests of bronze plated wire the steel tried to "protect" this plating through each pin-hole opening; hence this enormous accumulation of fatigue cracks and the resulting "embrittling effect." (Note: This phenomenon should in no way be associated with hydrogen embrittlement.)

✦ ✦ ✦

SOUND engineering practice dictates that metallic materials subject to possible service overload must have ductility to absorb this shock. If the material loses its ductility under service conditions the phenomenon should be given careful consideration. Certain commercial usages require a copper plated steel wire. The results of these tests, together with other evidence, suggests that if the wire be subjected to variable loading in a potentially corrosive environment there should be an "interlining" of some basic plating to protect the steel. In this paper reference is made only to thin coatings such as many have unavoidable pin-hole imperfections. The important question of what basic plating depends on the purpose to which the material is to be applied in service. The Electromotive Series of Metals may be taken as a guide though not as the final authority to the order of resistance to corrosion.

✦ ✦ ✦

ACKNOWLEDGMENT: Appreciation is expressed to the Department of Civil Engineering, Columbia University, for the use of their laboratory facilities.

✦ ✦ ✦

## Training Course for Carbide Die Users Announced

A SPECIAL training course for users of carbide dies has been put into operation at Carboloy Company, Inc., Detroit 32, to meet the increased need for trained die-room employees.

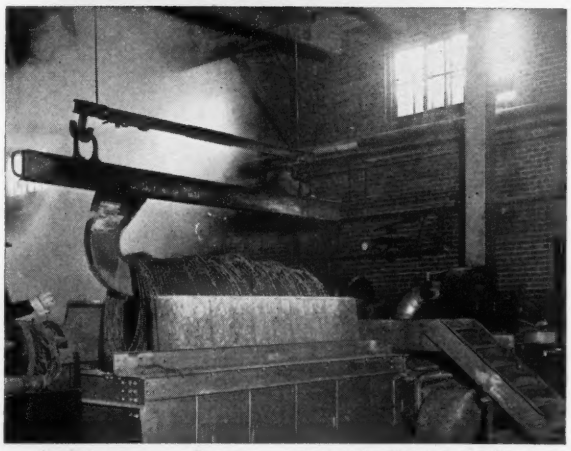
IT is designed as both a training course for new employees and a "refresher" course for more experienced die service men, and serves to acquaint the men with the vast changes and improvements in carbide die servicing methods and equipment made available during the last year or so.

✦ ✦ ✦

THE course is available to individuals selected by any user of cemented carbide dies regardless of make. Individuals selected should preferably be men who will function in key positions in die service rooms, to enable them in turn to train other men on return to their mills. All men taking the course must be citizens of the U.S.A.

✦ ✦ ✦

EXPERIENCE has demonstrated that a minimum of three days is required for each subject. Among the courses offered are the following: Round Hole Carbide Drawing Dies; Carbide Shape Dies; and Cartridge Case Dies.



Patented and Patents Pending

**Carl-Mayer Hi-Speed Rod Baker is the fastest rod baker built — no other rod baker even approaches its speed and economy. Blow-Off Feature removes moisture without bumping or agitating the coils.**

**But you don't need to take our word for it! Let us tell you where you may see this remarkable rod baker in operation and consult with enthusiastic users. Past performance is a guarantee of results to come.**

CARL-MAYER HI-SPEED TRADE MARK ROD BAKER

*The Carl-Mayer Corp.*
*3030 Euclid Ave., Cleveland, O.*

**ROD BAKERS, WELDING ROD OVENS, INDUSTRIAL FURNACES**

***A FEW CARL-MAYER CUSTOMERS:***

Allegheny Ludlum Steel Co.
Aluminum Co. of America
Atlantic Wire Co.
Atlas Steel Co.
American Magnesium Corp.
Bridgeport Brass Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Ford Motor Co.
General Motors Corp.
Hollup Corporation
Hyatt Roller Bearing Co.
Johnson & Nephew, Ltd.
Page Steel & Wire Co.
Pittsburgh Tool Steel Wire Co.
Reliance Manufacturing Co.
Steel Co. of Canada
Timken Roller Bearing Co.
Thompson Products Co.
Weatherhead Co.
Wickwire Spencer Steel Co.

# Outstanding Personalities of the Wire Industry

### J. P. Williams, Jr., Dist. Repr., Syncro Machine Co., Awaits Induction

J. P. WILLIAMS, JR., well-known Chicago district representative of the Syncro Machine Company, left for Texas on July 1st, to await induction into the Army. The Chicago office will be retained but, for the present, all communications should be addressed to the executive offices of the Syncro Machine Company at Rahway, New Jersey.

✦ ✦ ✦

### V. H. Mantz Assistant to Secretary and Treasurer, Allegheny Ludlum Steel Corp.

THE appointment of **Victor H. Mantz** as Assistant to the Secretary and Treasurer of the Allegheny Ludlum Steel Corporation, succeeding **E. J. Hanley**, has been announced by the corporation's Board Chairman, **W. F. Detwiler.**

J. P. WILLIAMS, JR.

MR. MANTZ, who will be located at Allegheny Ludlum's Brackenridge, Pa., offices, was formerly associated with the firm of Snyder, Ellinger and Davies, Accountants and Auditors. He is a native of Pittsburgh and attended the University of Pittsburgh. A certified public accountant, he has been associated in public accounting capacities for the past 18 years with various firms in the Pittsburgh area.

✦ ✦ ✦

### Carl King

CARL KING, superintendent of the Palmer plant of the Wickwire Spencer Steel Company since 1925, died at his home in Palmer, Mass., Saturday, June 26th, 1943. He was 63 years old.

✦ ✦ ✦

MR. KING attended Phillips Academy, Andover, and the Massachusetts Institute of Tech-


MOSSBERG **PRESSED STEEL** CORP.

Greater service from a new All Welded Steel Take Off Reel designed to meet present day requirements.

Usual maintenance expense eliminated by adoption of this new design wherein all parts are welded into one homogeneous unit.

Reel sides are embossed with radial reinforcing ribs for increased rigidity with rolled edges for additional strength and to facilitate handling.

Complete line of spools and reels for both processing and shipping all kinds of bare and insulated wires and cables. (Send for Catalogue W-104)

All Welded Steel Take Off Reel

**MOSSBERG**
PRESSED STEEL CORP.
18 West Street
Attleboro, Massachusetts, U. S. A.

Ross Whitehead & Co., Ltd.,
Montreal & Toronto, Canada.

James Day (Machinery), Ltd., "Ford House," 88 Regent Street, London, W. I., England.

nology. He was an instructor in the mechanical engineering department of M.I.T. for two years. In 1906 he was made assistant superintendent of the American Steel and Wire Company, and in 1909, organized a mill for them in New Haven, Conn. In 1911 he helped organize Wentworth Institute, where he also taught for several years.

✦ ✦ ✦

MR. KING was a member of the American Petroleum Institute, and had served on several of its committees. He also was a member of the technical committee of the Wire Rope Association, a director of the Iron and Steel Institute of London, and a member of the American Society of Metals, the American Society of Mechanical Engineering, and the Wire Association.

✦ ✦ ✦

### Brown Instrument Names Two New Vice-Presidents

APPOINTMENT of **George M. Muschamp** and **Paul L. Goldstrohm** as vice-presidents of the Brown Instrument Company of Philadelphia, Pa., was announced June 22 following a meeting of the Board of Directors.

✦ ✦ ✦

MR. MUSCHAMP will be vice-president in charge of engineering and Mr. Goldstrohm will be vice-president in charge of production. Both posts are newly created. The former has been with the Brown engineering department for 12 years and the latter recently celebrated his 20th year with the company.

✦ ✦ ✦

### Bristol Appoints New Manager of Development and Design Engineering

J. W. **PECKHAM** has been appointed Manager of the Development and Design Engineering Department for The Bristol Company, Waterbury, Connecticut, manufacturers of automatic control and recording instruments.

MR. PECKHAM was graduated in electrical engineering from Rhode Island State College in 1921, after which he joined the Radio Research Department of the General Electric Company. In 1922 he joined the Bristol radio engineering department.

✦ ✦ ✦

IN 1940 he was appointed Pacific Coast District Manager, in charge of the company's San Francisco, Seattle, and Los Angeles offices and San Francisco branch factory.

✦ ✦ ✦

### E. W. Rainey, Staff Asst., Wire Mill Supt., Columbia Steel Company

EDGAR W. RAINEY has left his position as metallurgist with the Republic Steel Corp., Chicago District, to accept a position as staff assistant to the wire mill superintendent of the Columbia Steel Co., Pittsburg Works, Calif.


WIRE and CABLE
*Processing*
EQUIPMENT

COMPLETE LACQUERING SYSTEMS
•
DRYING ROOMS
•
LACQUER POTS
•
STOP WIRE SHUTOFFS
•
SPECIAL PROCESSING OVENS FOR WIRE AND CABLE

REEL STANDS UNWIND
•
REEL STANDS WINDUP

*FREE ENGINEERING DATA*
Among other vital information in this book is a blueprint of a typical cable-oven installation, of interest to all wire and cable processing men. Send today for your free copy.

*The*
INDUSTRIAL *Oven Engineering* COMPANY
Engineered Industrial Ovens • Special Handling Equipment • Contract Engineering
11621 DETROIT AVE. CLEVELAND, OHIO

# A Review of Recent Wire Patents

No. 2,320,412, APPARATUS FOR ANNEALING AND COATING WIRE, patented June 1, 1943 by John Cook, Ridgewood, N. J.

A pair of spaced-apart electric current-carrying contact wheels are provided, with a protective tube intermediate the wheels, and the lower end of the tube disposed in a molten metal bath.

✦ ✦ ✦

No. 2,320,706, SPRING-FILLED PACKING, patented June 1, 1943 by Charles T. Ripley and Walter M. Gibbs, Chicago, Ill., assignors to Spring Packing Corporation, Chicago, Ill., a corporation of Illinois.

The packing consists of a body of waste and a number of small coil springs, with eyed ends, embedded therein in isolated relation.

✦ ✦ ✦

No. 2,320,796, METHOD OF MAKING HIGH TENSION ELECTRIC CABLE, patented June 1, 1943 by Hubert H. Race, Schenectady, N. Y., assignor to General Electric Company, a corporation of New York.

This method includes the steps of providing a body of dry fibrous material over the stranded wires, which body is whetted, and tightly wrapping a second body of insulation over the whetted fibrous material, so that the latter will

**Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.**

be compressed into the outwardly-opening spaced between the wires.

✦ ✦ ✦

No. 2,321,021, COMPOSITE ELECTRICAL CONDUCTOR, patented June 8, 1943 by Daniel P. Dyer, Jr., Chagrin Falls, Ohio, assignor to The American Steel and Wire Company of New Jersey, a corporation of New Jersey.

Consisting solely of three wires, with one a straight steel wire having a diameter of about .112 to .115 of an inch with a relatively high tensile strength and a pair of wires with each having a diameter of about .093 of an inch wrapped around the steel wire in side-by-side relation and having the quality of good electrical conductivity.

✦ ✦ ✦

No. 2,321,378, COMBINATION SCREW AND RIVET, patented June 8, 1943 by Emmet M. Green, Los Angeles, Calif.

The stem carries a V-thread with an arcuate shoulder forming a continuation of the stem at zero pitch.

✦ ✦ ✦

No. 2,321,379, COMBINED SCREW AND RIVET, patented June 8, 1943 by Emmet M. Green, Los Angeles, Calif.

In this form, the thread has one end portion forming an arcuate shoulder spaced from the head and inclined away from the same.

✦ ✦ ✦

No. 2,321,612, WIRE DRAWING APPARATUS, patented June 15, 1943 by Norman H. Nye, Cuyahoga Falls, Ohio, assignor to The Vaughn Machinery Company, Cuyahoga Falls, Ohio, a corporation of Ohio.

This assembly includes a die with an electric motor driven wire drawing drum arranged forwardly thereof for drawing wire therethrough, and a movable tensioning sheave arranged rearwardly thereof for placing a back tension on the wire being drawn, an electric tensioning motor connected to this sheave for biasing the same against movement under the influence of the back tension of the wire being drawn, and means responsive to the pull of the drawing drum for varying the force exerted by the electric tensioning motor in accordance with variations in the pull of this drawing drum.

✦ ✦ ✦

No. 2,321,646, APPARATUS FOR COILING WIRE, patented June 15, 1943 by Albert G. Blodgett, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass., a corporation of Massachusetts.

Apparatus is provided for the con-

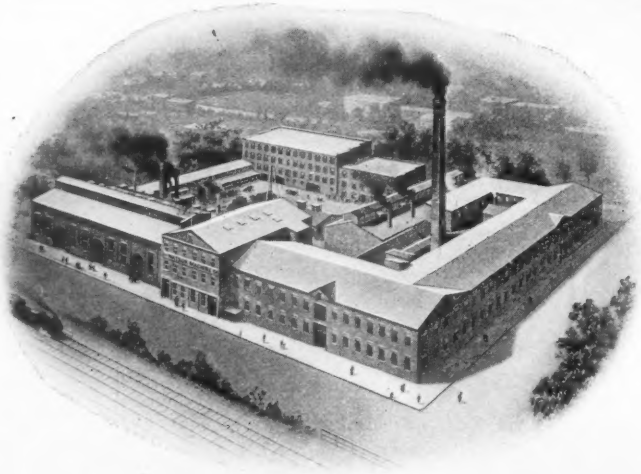

THE WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE AND WIRE ROPE MACHINERY

Stranders
Bunchers
Cablers
Closers
Armor. Machines
Tapers
Juters
Serving Heads
Compound Tanks
Saturating Tanks
Powderers and Chalkers
Capstan Sections



Let-offs
Gang-Spoolers
Re-winders
Capstan Takeups
Continuous Takeups
Heavy-Duty Takeups
Traverses
Measuring Mach's.
Testing Mach's.
Vulcanizers
Polishers
Reel Crutches

MEAS. MACH'S., TRAVERSES, REEL CRUTCHES, BUNCHERS, SMALL POWDERERS, ETC. — USUALLY CARRIED IN STOCK

LITERATURE AVAILABLE ON ALL LISTED UNITS

tinuous coiling of wire, with new means to sever the wire.

✦ ✦ ✦

No. 2,321,790, SPRING STRUCTURE, patented June 15, 1943 by Edward L. Bass, Chicago, Ill.

A spring member is formed of a single strip, with fingers extending from one edge and bent to form loops. Upon the application of pressure in a direction parallel to the plane of the loops they will tend to wind up upon themselves and be placed under tension.

✦ ✦ ✦

No. 2,321,817, SPRING FRAME ASSEMBLY, patented June 15, 1943 by William E. Hutton, Dickson, Tenn.

Bowed wire springs are provided in this assembly.

✦ ✦ ✦

No. 2,322,024, METHOD OF BURNISHING SCREW STICK HEADS, patented June 15, 1943 by Miller R. Hutchison, Jr., Rochester, N. Y., assignor to Eastman Kodak Company, Rochester, N. Y., a corporation of New Jersey.

A method is provided which comprises turning an end screw of a stick into work through a torque applied to another screw through the narrow neck of the screw until this neck fractures and burnishing the fractured neck by continued rotative contact of the fractured neck with the seated screw.

✦ ✦ ✦

No. 2,322,483, METHOD FOR MANUFACTURING INSULATED WIRE, patented June 22, 1943 by John R. Stricklen, Akron, Ohio, assignor to National Rubber Machinery Company, Akron, Ohio, a corporation of Ohio.

Wire, coated with vulcanizable material is fed through a vulcanizing zone maintained at sufficiently high temperature to form a hardened surface or skin on the coating, and passed through a second zone maintained at a relatively lower vulcanizing temperature than the first zone to complete the vulcanization of the coating.

✦ ✦ ✦

No. 2,322,509, SCREW, patented June 22, 1943 by William A. De Vellier, New York, N. Y.

A shallow partially spherical guide recess as well as a conventional slotted recess is provided in the head, the former being concentric with and of much less depth than the slotted recess, of much less diameter than the length of this recess, of greater diameter than the length of the recess and of greater diameter than the width of the recess.

✦ ✦ ✦

No. 2,322,605, WIRE TAGGING MACHINE, patented June 22, 1943 by Anthony J. Verdechia, Baltimore, Md., assignor to The Glenn L. Martin Company, Middle River, Md., a corporation of Maryland.

The assembly includes a tape dispensing means, an anvil member adjacent this tape dispensing means, a sliding clamp member adapted to engage and clamp a wire lying on said this anvil member, the sliding clamp member having a knife portion secured thereto, to cut the tape from the wire, the knife portion serving to support the tape after the cut-off operation and means for urging the clamp toward the anvil to engage the article lying thereon.

No. 2,322,607, CONTINUOUS SUPPLY REEL FOR WIRE PROCESSING MACHINES, patented June 22, 1943 by George F. Wald, North Olmstead, Ohio, assignor to The American Steel and Wire Company of New Jersey, a corporation of New Jersey.

A planetary tubular arm is provided, through which the wire passes.

✦ ✦ ✦

No. 2,322,757, MOLD FOR HELICAL SPRINGS, patented June 29, 1943 by Ralph E. Ward, Erie, Pa.

An inner and outer mold section is adapted to provide a groove for forming the spring and the loop on the end thereof.

✦ ✦ ✦

No. 2,322,773, ELECTRICAL CONDUCTOR, patented June 29, 1943 by Melville F. Peters, Beltsville, Md.

Rope, impregnated with carbon, surrounds the wire conductor, with a rubber coating over the rope.


This is an invitation for you to become a member of The Wire Association. ✦ ✦ ✦ ✦ ✦ ✦

The Annual Dues are $10.00

✦ ✦ ✦

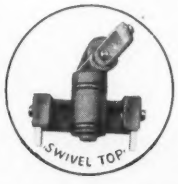
For Details Address

Richard E. Brown, Secretary
The Wire Association
300 Main St., Stamford, Conn.
Tel: Stamford 3-0482

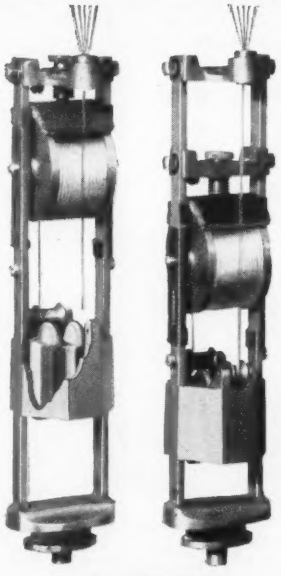


"TRITON" HIGH CAPACITY WIRE CARRIERS

For Precision Hard Wire Braiding, Hydraulic Flexible Tubing, Hose and Electric Cables




Fitted To All Sizes Except No. 1A.



No. 1A "TRITON" CARRIERS.

Length of Wire Braid.

Heavy Tension.
Perfect Control.
Can Be Fitted To Most Braiding Machines.

Send Us:-
Horngear Size, Depth and Profile of Track and Number of Gears or Carriers.

Patented In All Principal Countries

SEND FOR LEAFLET 10/4

| Carrier | Horngear Dia. | Bobbin Size | Wt. of Wire | Tension |
|---|---|---|---|---|
| 1A | 4ins. | 2¼ins. x 1¼ins. | 1 lb. | 1·25 lbs. |
| 3A | 6⅜ins. | 3½ins. x 1¾ins. | 3·25 lbs. | 5·75 lbs. |
| 4A | 7½ins. | 4½ins. x 2ins. | 6 lbs. | 7 lbs. |
| 6LB | 11 1/16ins. | 6¼ins. x 3ins. | 17·25 lbs. | 11 lbs. |

SOLE MANUFACTURERS
B. & F. Carter & Co., Ltd., Bolton, England
ALBION WORKS • WATERLOO STREET
MACHINERY FOR BRAIDING, TUBING, INSULATING CABLES, ETC.

## New Bonding Method Replaces Riveting or Spot Welding for Metal Assembly

A METHOD of bonding metal to metal, or rubber, synthetic rubber, plastics, leather or wood to metal, or to each other, with a bond in most instances stronger than the materials themselves, has recently been announced by **The U. S. Stoneware Co.**, Akron, Ohio, manufacturers of Tygon synthetic materials and corrosion-resistant equipment.

THE new process, known as the Reanite Bonding Process, develops a bond — metal to metal — which in repeated tests has shown itself to be stronger than riveted or spot welded joints. The normal bond between metals ranges from 1000 #s psi to as high as 3000 #s psi. The bond developed between rubber and metal ranges from 900#s to as high as 2000#s compared to the average 250-400# bond obtained by conventional processes. On tests of bonds formed between natural rubber, synthetic rubber, plastics, leather and wood, the materials themselves gave way before the bond.

+ + +

THE Reanite Process is suitable for use with almost all metals —iron, steel, stainless steel, magnesium, aluminum, aluminum alloys, copper, bronze and brass.

+ + +

THE application of the process is simple. The surfaces to be joined are brushed, sprayed or dipped with Reanite. After drying, mild heat and pressure is applied.

+ + +

THE Reanite joint is unaffected by fresh or salt water, is non-corrosive to metals, possesses excellent corrosion-resistance in itself, and high dielectric strength. While the bond develops its maximum strength at room temperatures, its strength over a temperature range of from —40°F to as high as 300°F is substantially stronger than bonds obtained by conventional processes.

+ + +

WHILE Reanite is formulated through cyclic modifications of materials high on the critical list it is available for immediate shipment for essential end-uses.

+ + +

PRESENT uses include fabrication of aeroplane sub-assemblies, motor mounts, sound and vibration damper assemblies, instrument mounts, composite metallic and plastic units, and others. Future uses foreseen include prefabricated housing units, metal-clad plywood for kitchen cabinets, boats, airplane assemblies, etc.

+ + +

## New Automatic Heat Control

A new development for adding heat to industrial liquids for the purpose of maintaining constant temperatures as desired, with automatic control, is announced for the NIAGARA AERO HEAT EXCHANGER. This has not been previously done with the evaporative type liquid cooling unit using a water spray and fans to draw air over coils containing the liquid whose temperature is to be con-

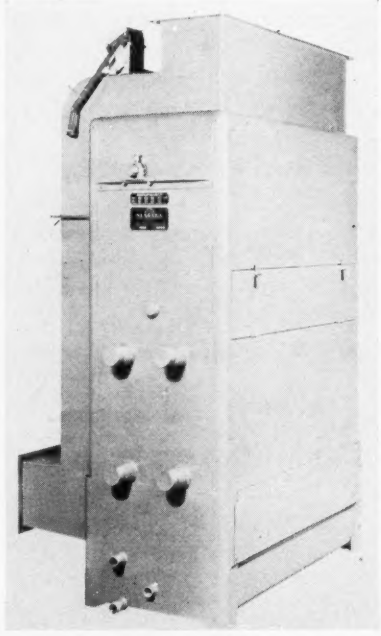

**Industrial Heating Equipment by the Originators of FLASH BAKING**

MORRISON ENGINEERED
FLASH
BAKERS
Morrison Oven for paint, core and mold baking, aluminum aging, stress relieving, etc. Temperature range up to 600°F.
Morrison Model "R" Air-Circulating Type Furnace for fast, economical heat treating. Temperature range to 1750°F.
Morrison Continuous Furnace for aluminum heat treating and forging or stress relieving and drawing of steel. Temperature range to 1000°F.
Morrison Duplex Hopper Type Portable Furnace for small aluminum forgings.
Morrison Continuous Annealing Furnace with controlled cooling. Temperature range up to 1750°F.
Morrison Galvanizing Kettles. Morrison Engineered tanks or kettles of any size or shape may be heated by gas or oil by re-circulating hot air around the tank.
Typical Examples of Morrison Engineered oil, gas and electric fired furnaces and ovens now giving complete satisfaction in every type of industrial service. Many standard types can be built in four to six weeks—in time to help you lick your war production difficulties.
Save time and money by permitting our engineering staff to work out your industrial heating problems. No charge for this service. Write today.
MORRISON ENGINEERED
MORRISON ENGINEERING CORPORATION
5005 EUCLID AVENUE · · CLEVELAND, OHIO
Associate Companies: MORRISON ENGINEERING OF CANADA, LTD. TORONTO, ONTARIO
CARRIER ENGINEERING CO., LTD. LONDON, ENGLAND

trolled. This is accomplished by using either a steam coil or injector or an electric heating unit to heat the spray water. U. S. Patent #2,321,933 has recently been granted on this equipment.

✦ ✦ ✦

THE result is control of liquid temperatures within prescribed limits, alternately cooling or heating as required. The heating device is put into operation by thermostatic control at the desired point, preventing the liquid from becoming too cold for the process in which it is used, or from becoming viscous with retarded flow and loss of capacity, or from congealing or freezing. This also makes it possible for the Heat Exchanger to be successfully installed out of doors, or to use fresh, out-of-door air to increase its evaporative cooling capacity and avoid damage from handling air containing corrosive substances.



Niagara Aero Heat Exchanger equipped with automatic heat control. Type X Unit. ✦

✦ ✦ ✦

THE Heat Exchanger with these features is used to control temperatures in industrial, chemical process and electrical equipment by controlling jacket water temperatures, also quenching baths in the heat treating of metals, cutting oils and lubricants in metal working, machining and wire drawing, controlling temperatures of chemical process liquids in many fields, and engine jacket water. It is also applied to air and gas compressors. It is manufactured by NIAGARA BLOWER COMPANY, 6 E. 45th Street, New York, 17, N. Y.

✦ ✦ ✦

### New Bulletin On Recording Thermometers

A NEW Bulletin, No. T800, with forty pages of useful and technical information on thermometry and thermometers has just been published by **The Bristol Company,** Waterbury, Connecticut. The bulletin describes their line of recording thermometers with considerable space given to the basic theory of the several types offered, as well as practical information regarding ranges, charts, bulbs, and tubing available. Copies of this bulletin may be had upon request.

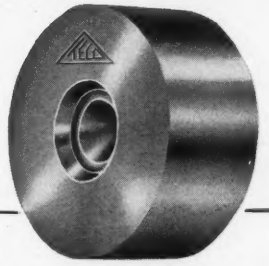

WANTED! INCREASED WIRE PRODUCTION

FOUND in your present machines when equipped with TECO CARBIDE DIES

Your present wire machines can be made more productive by equipping them with TECO Carbide Dies. Here's why: TECO Carbide is manufactured to rigid standards of hardness, density and uniformity. It has greater resistance to frictional wear, thus stays on the job longer — produces extra tonnage of smoothly finished, accurate-gauge wire.

These facts have been proved wherever wire mills use TECO Carbide Dies. Equip a few machines with TECO Carbide Dies and make your own comparisons. Let us know your requirements.

Tungsten Electric Corporation
564 39th Street Union City, N. J.
Branch Office: 2906 Euclid Avenue, Cleveland, Ohio.
Representative: Architects and Builders Bldg., Indianapolis, Ind.



WIRE and BAR DIES
EXTRUDING DIES
TUBING DIES
SIZING DIES

TECO Pioneers in Tungsten Carbides for over a Quarter Century CARBIDE DIES

## Co-operation in the Wire Industry

ONE of the fine things growing out of the Wire Association is the increasing evidence of willingness to cooperate with the other fellow. Most wire men have long since learned that there is more to be gained by a free exchange of experiences than by trying to keep under a cloak of mystery certain secret processes or equipment that they may have developed. Possibly that is one of the greatest contributing factors to the rapid strides forward that the Industry has taken in the last decade. Few "secret" processes are unknown to others anyway, but for long years most men of the Industry found a measure of consolation in the thought that they had something that the other fellow didn't have.

✦ ✦ ✦

WHEN these shackles were dropped, the whole field began to move upwards and to enjoy a greater measure of prosperity. That was the result of broadening the general knowledge of the best way to do things, so that the ultimate consumer got more for his money. This pooling of knowledge has not reduced the identity or individuality of a single concern, but so increased service to society that society has become a better customer.

✦ ✦ ✦

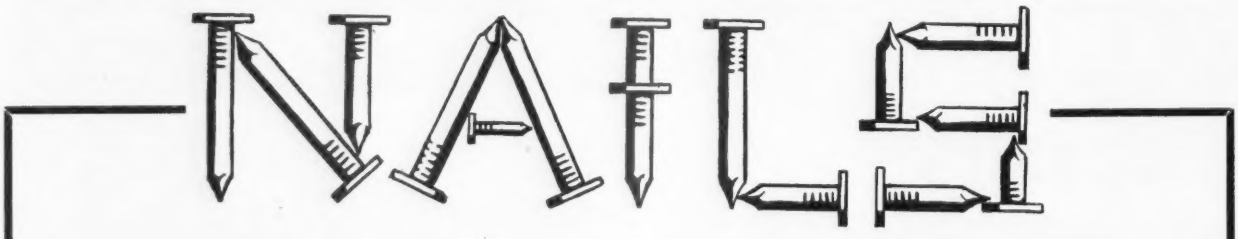
THIS gradual growth toward full co-operation has been greatly accelerated by the war, and it is to be hoped that when the war is over and men are again cultivating the broad acres of peace-time business, the lessons learned will have been drunk deep and understandingly by all. However, the trend started with the formation of the Wire Association, through which men came to know one another and to learn that fellow members were a pretty good sort, and human, with joys and heartaches, "even as you and I". The late Andrew D. White, a former president of Cornell University, once said: "The man I don't like is the man I don't know." So wire men have come to know and to like and to trust others in the industry, through meeting with them year after year at conventions, there exchanging views on a give and take basis.

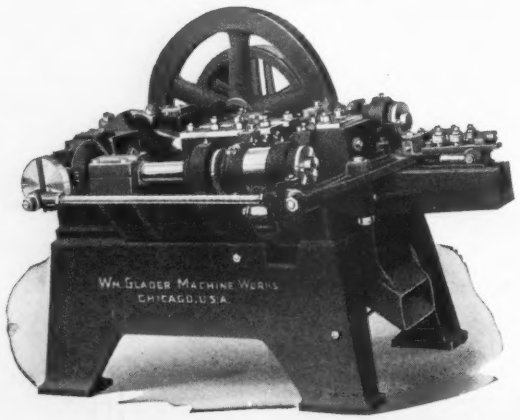
✦ ✦ ✦

TO those who serve the wire industry through the manufacture of machinery, equipment and supplies for it, there has also come this opportunity to know their competitors, and it is to be hoped that this fact may be in a measure accountable for the gradual dwindling of "dirty tactics", "knocking", and so forth, about so much of which used to be heard. Components of any branch of the Industry would do well consciously to cultivate their competitors, for in this knowing and understanding of the other fellow there is bound to develop better business and business relationships for all.

✦ ✦ ✦

NO one concern can possibly do all the business. No one makes machinery or supplies of such universal character that it


**Steel frame high speed wire nail machines. Built in eleven different sizes and types to cover efficiently the making of nails from the small brads to the 12" spikes.**

***Write for catalog and production table.***

**WM. GLADER MACHINE WORKS**

**210 N. RACINE AVE.** **CHICAGO, ILLINOIS**

can meet all customer's requirements. Should each sale staff learn the limitations and virtues of his own Company's products, sell them where they belong, and help the other chap to get what he should have (for the customers' benefit), the millenium in the wire suppliers field would rapidly approach, and life would be easier and healthier for all.

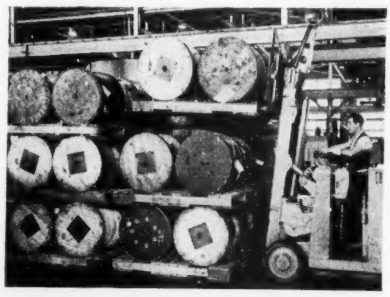
✦ ✦ ✦

SO we hope that when suppliers' representatives come to our Conventions to meet their customers and prospective customers, that they will take a leaf out of the experience of the wire men and spend some time cultivating the friendly cooperation and good will of their fellow salesmen. Those who have gone out of their way to do this find they are not so bad a lot of boys, after all.

✦ ✦ ✦

### Reels Handled More Efficiently

AN interesting example of one of the many ways in which time and space are being conserved at General Electric's Schenectady works is shown in the accompanying illustration, showing their present method of storing reels.

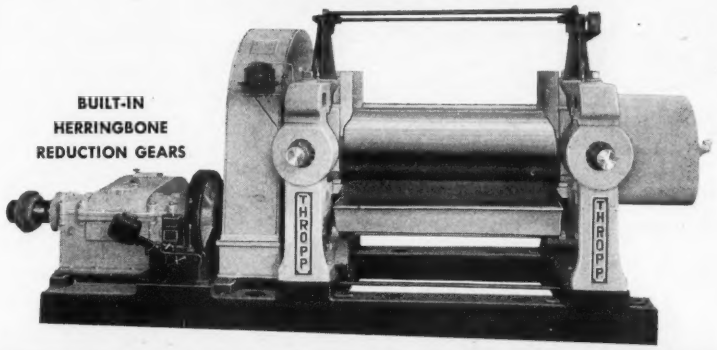


THE pallets were made especially for cable reels, and save both handling time and storage space. Prior to this much more efficient method, reels required considerably more space for storage inasmuch as they could not be stacked on top of one another.


New! HEAVY DUTY MILLS
Size 20 & 22 x 60 Inch

for·· Compounding and Warming of Synthetic Rubber and Tough Resins. Custom built to your requirements.

*Write for Complete Information*




WM. R. THROPP & SONS CO. TRENTON New Jersey
WASHERS CRACKERS REFINERS CALENDERS

WILLEY'S DIES LAST MUCH LONGER

SIZING, EXTRUSION and WIRE DRAWING DIES

Manufactured in all sizes, to meet your requirements, from a specially developed grade of Tungsten Carbide having freedom from porosity, exceptional abrasion resistance and the ability to take a polish equal to that of diamonds. Furnished in four classifications, (1) blank and rough cored nibs, (2) rough cored dies, (cased), (3) semi-finished, rough drilled dies, (cased), (4) finished dies, ready to use.

WRITE FOR CATALOG

WILLEY'S CARBIDE TOOL CO.
1340 W. Vernor Highway, Detroit, Michigan

# the sum of little things well done is victory

We know that fine alloy wire alone won't win the war . . but even such small things play fateful parts in vital war material. Our responsibility is in making fine alloy wires—crimped or straight—in fifteen major metals and their alloys —drawn to high standards of accuracy—with the Temper to beat the enemy, the Tolerance to do its job well, and the right Finish, for many war applications.

Whatever your requirements, you will find CALLITE fine alloy wires dependable—easy to handle, long-wearing and uniform, with the maximum strength of the specific alloy being used. Prompt deliveries and practical help in emergencies. Our metallurgists will gladly cooperate on your specific wire problems. CALLITE TUNGSTEN CORPORATION, 572 Thirty-ninth Street, Union City, New Jersey Branches: Chicago, Cleveland.

Brush, bonding jumper, spring, control cable or sieve wire is available in all diameters down to .002" on spools, in 50" or 60" hanks or cut to your specifications in the following metals:

Phosphor-Bronze, Brass (all grades), Silicon-Bronze, Hard Drawn Steel, Stainless Steel, Nickel-Silver, Monel Metal, Commercial Bronze, Silver, Beryllium-Copper Aluminum, Everdur, and Special Alloys

CALLITE TUNGSTEN CORPORATION CT REG. U.S. PAT. OFF.

**CALLITE WIRES**

A FINE WIRE FOR EVERY NEED

TYPICAL APPLICATIONS

Tube Attachment to Solid Fitting

Ball and Rod Attachment

Hose & Flexible Tube Fittings

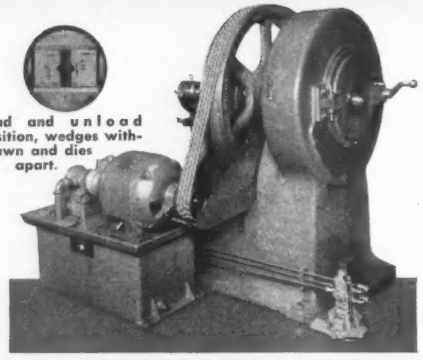
Metal Forms from Solid Bars

Union of Tubes

Cable Attachment and Electrical Terminals

**New "STANDARD" HYDRO-FORMER**

SHAPES AND JOINS METALS . . WITHOUT CUTTING



Load and unload position, wedges withdrawn and dies apart.

**Saves TIME, LABOR, METAL**

In one operation, this machine connects tubing or cables to solid fittings, or forms metal sections from solid bars without cutting. A feature of its design is the use of hydraulically-operated wedges to compress the dies so that swaging force is applied at right angles to the work . . . not obliquely as with tapered dies. In reducing outside diameter of tubing, therefore, tendency toward elongation is lessened and thickness of tubing wall is increased. Fittings having large ends can be put into machine without removing dies. This machine simplifies handling of many other operations which previously required more complex, time-consuming methods. Further information on request.

**STANDARD MACHINERY CO.**

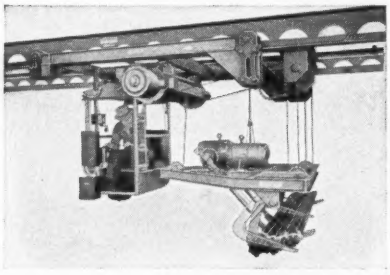
PROVIDENCE RHODE ISLAND


## New Pipe and Rod Carrier

A NEW motor-driven pipe and rod carrier developed by the Cleveland Tramrail Division of The Cleveland Crane & Engineering Company, Wickliffe, Ohio, permits the cab operator to pick up 1500 lbs. of stock in 12 foot lengths from the storage room, transport and set it in racks at fabricating machines, without any floor men.

✦ ✦ ✦

SINCE the unit travels overhead its use eliminates the need of aisles and makes possible the saving of considerable floor area. In fact, the unit illustrated so reduced the need of floor space in an important war plant that 400 metal working machines could be installed and operated efficiently in a space slightly larger than that ordinarily required for 200 machines. This made possible a tremendous saving in building construction materials as well as a saving in capital investment. This one unit keeps all of these fast-working machines supplied with stock.



AN outstanding feature of this equipment is the safety with which loads can be moved above machines and men. Materials transported need not be in balance nor is it necessary for the operator to spend time in locating the center of gravity of the load. The pick-up fork assembly has a 3-point rope suspension from the carrier which gives it the necessary rigidity for handling loads that are far out of balance. Another factor providing stability is the double overhead track system on which the carrier travels. This minimizes swing.

## Army to Relinquish 20,000 Tons of Barbed Wire for Use On Farms

APPROXIMATELY 20,000 tons of barbed wire with extra long barbs, made for military purposes, will be used to meet a shortage of barbed wire on the farm.

✦ ✦ ✦

THE shortage was aggravated by the recent mid-western floods which washed out many miles of fence. The action is a part of the office of civilian requirements' program to make needed farm supplies available to farmers.

✦ ✦ ✦

UNDER the arrangement, the Defense Supplies Corporation will purchase the barbed wire (12 gauge, 4 point) from the Army and resell it to the companies which made it. Those companies, in turn, will use the wire temporarily relinquished by the Army to fill orders from distributors serving farm areas.

✦ ✦ ✦

THE arrangement with the Army calls for replacement by W.P.B. of the "borrowed" barbed wire within 90 days.

✦ ✦ ✦

## Cleaner For Steel Artillery Shells

THE American Chemical Paint Co., Ambler, Penna., has issued a bulletin describing DE-OXIDINE #170, a phosphoric acid cleaner especially adapted to deoxidizing steel shell cases before varnishing. The cleaner removes rust, scale and light oil, and produces a clear, minutely etched surface that will hold paint or varnish well. With the illustrated bulletin go two technical data sheets, one describing the use of the cleaners in detail and the other giving a diagrammatic picture of the steps of the process. Ask for Technical Service Data Sheets Nos. P-100-2, P-100-3 and 3-8-170-2, if interested.


Gilron

**DRAW YOUR WIRE THE MODERN WAY with**

**GILRON COATING COMPOUNDS**

**A big step forward in wire drawing. Thoroughly proven in mill practice. Makes possible wire drawing speeds heretofore considered impracticable. Increases die life, prevents scratching of wire, produces better finish and eliminates use of lime in many cases.**

***These coating compounds are of particular value in the more difficult operations — stainless, alloy, high carbon and welding rod wire. Multiple reductions can be drawn without re-coating.***

**Coatings for Drawing Stainless, Alloy, Low and High Carbon and Copper Coated Wires**

**Let us confer with you. Write or telephone for particulars.**

**GILRON PRODUCTS COMPANY**

**1559 EAST 40th STREET ● CLEVELAND, OHIO**

**Telephone HEnderson 8375**

**SHE'S FIGHTING TOO!**

**Making Parts Without Dies**

No delay waiting for dies—parts ready quicker—deliveries speeded up—all to bring the Victory sooner! Women are rapidly taking a major place on the industrial front. DI-ACRO Precision Machines—Shears, Brakes, Benders—are ideally suited for use by women in making duplicated parts accurate to .001″ — DIE-LESS DUPLICATING. Thousands of DI-ACRO Machines are now in use in War plants.

**BRAKES**
(Illustrated)
Di-Acro Brake forms non-stock angles, channels or "Vees". Right or left hand operation. Folding width — Brake No. 1 — 6″. Brake No. 2 — 12″. Brake No. 3 — 18″.

**BENDERS**
Di-Acro Bender bends angle, channel, rod, tubing, wire, moulding, strip stock, etc. Capacity — Bender No. 1 — 1/4″, round cold rolled steel bar. Bender No. 2 — 1/2″ cold rolled steel bar.

**SHEARS**
Di-Acro Shear squares and sizes material, cuts strips, makes slits or notches, trims duplicated stampings. Shearing width — Shear No. 1 — 6″. Shear No. 2 — 9″. Shear No. 3 — 12″.

**Send for Catalog**
**"METAL DUPLICATING WITHOUT DIES"**
It's an eye-opener on what you can do without dies, shows typical parts, and gives sizes and capacities of all models of Di-Acro Shears, Brakes, Benders.

O'NEIL-IRWIN DI-ACRO PRECISION MACHINES MFG. CO.

**303 8th Avenue So., Minneapolis 15, Minn.**

A UNITED AMERICA CANNOT FAIL

◆

Warner Company

BELLEFONTE DIVISION

MANUFACTURER

*Bell-Mine Lime Products*
*For Use in Wire Drawing Processes*

PLANT, BELLEFONTE, PA.

SALES OFFICES: PITTSBURGH, PHILADELPHIA, BELLEFONTE, N. Y. CITY

◆

*"Words Won't Win This War—Buy War Bonds"*

**FOR FINE WIRE NO FINER LUBRICANT**

•

Compounded especially for high-speed machines.

Completely soluble—No fillers—Hence no clogging up of spray jets.

Extremely stable: Uniform, die-saving, trouble-free lubricity at all times.

*Economical in use—Efficient in operation.*

**Apex "SFV" Wire Drawing Compound**

•

*Address inquiries to:*

**APEX ALKALI PRODUCTS COMPANY**

Main & Rector Sts., Phila. Pa.

## Device for Identifying Ferrous Alloys

IN the light of recent news items about the varying quality of steels, a device called the IDENTOMETER has come to our attention that may be of interest. This is an electrical instrument said to identify instantly and accurately, by the use of reference specimens, any ferrous alloy.

A KNOWN sample is affixed to one of two clamps, and the unknown specimen to the other. When the two pieces of metal are brought into contact, a lighted indicator registers on an easily read scale whether or not the two are of the same chemical analysis.

✦ ✦ ✦

THE machine is about the size of a small cabinet radio and can be used in laboratories, shops or warehouses. Extreme simplicity of operation makes it adaptable for use by personnel without exceptional skill. A special attachment has been arranged to make it applicable to use on wire. It is said to be possible with this instrument to classify "unknown pieces" or lots of steel according to:

**A. Heats (identical analysis)**
**B. Grades (similar analysis)**
**C. Types (dissimilar analysis)**
**D. Heat Treatments (identical analyses with dissimilar structure)**
**E. Composite types (two and three plys, clad metals, sheer knife, etc.)**

**IMMEDIATE RECOGNITION!**

**ACCORDED THIS FOUR-STAR BOOK**

★ Practical ★ Original ★ Interesting ★ Complete

From all quarters has come commendation of this latest ASM book on practical metallurgy. Already four famous engineering schools—Case School of Applied Science . . . University of Wisconsin . . . Brooklyn Polytechnic Institute . . . Stevens Institute of Technology — are planning to use this book as a textbook for their courses in metallurgy.

Typical of other responses is that from Dr. Zay Jeffries, General Electric authority, who says: "The book constitutes a valuable addition to the literature of metallurgy".

If you haven't ordered your copy, do so today. You'll agree when you receive "Practical Metallurgy" that this is the finest book on this subject available today.

**PRACTICAL METALLURGY**

Applied Physical Metallurgy — Industrial Processing of Ferrous and Nonferrous Metals and Alloys

by

GEORGE SACHS,
Case School of Applied Science
and
KENT R. VAN HORN,
Aluminum Company of America

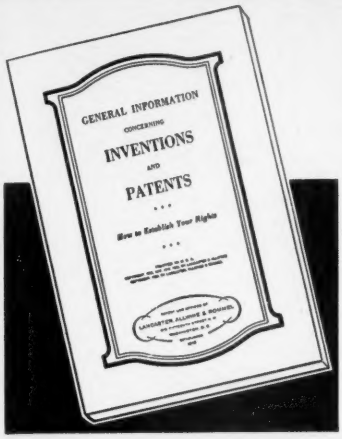
570 Pages . . . 355 Illustrations . . . 6x9 . . . Red Cloth Bound

**$5.00**

In addition to 335 general illustrations, PRACTICAL METALLURGY contains 160 constitutional diagrams covering all systems that contain an important commercial alloy. These diagrams . . . the chapters on Plastic Deformation of Ferrous and Nonferrous Metals . . . and the chapter on Internal Stress in Metals contain information not available in any other book published in this country.

Here is the book you've long wanted — a simple yet complete treatise on practical metallurgy.

**WIRE & WIRE PRODUCTS**
300 Main St. Stamford, Conn.




**Send for a copy - it's free.**

**Interesting Booklet concerning Inventions, Patents, Trade-Marks and Copyrights, together with Schedule of Government and Attorney's fees, sent free on request. Simply ask for "booklet and fee schedule."**

**No charges are made for preliminary advice, either in connection with patent, trade-mark or copyright cases.**

**Lancaster, Allwine & Rommel**
Registered Patent & Trade-Mark Attorneys
438 Bowen Bldg., Washington, D. C.



ORDER YOUR COPY NOW—
LIMITED EDITION

**Diamond and Gem Stone Industrial Production**

PAUL GRODZINSKI

PRICE $5.00

**The use of diamonds and gem stones as dies for fine wire drawing, and of diamonds for cutting tools, is comparatively recent. Today it is extensive and increasing. In this book the author has brought together all the data and information available on the subject and has added the results of his own experience and research. Although dealing mainly with the actual production of the dies and tools, the knowledge this book imparts is of prime importance to tool users. Efficiency and economy in the use of diamond and gem stone dies and tools is not possible without a knowledge of production methods.**

✦ ✦ ✦

**There are reference tables and a large number of specially drawn illustrations included in this book. An endeavor has been made to leave no phase of the subject untouched.**

MAIL YOUR ORDER TODAY

WIRE & WIRE PRODUCTS
300 MAIN ST. STAMFORD, CONN.


IT can be used to identify metals in any stage of their working from the ingot onward if cooled to room temperature. Details may be secured by asking the Dravo Corporation, Neville Id. (25), Pittsburgh, Pa., for their Bulletin No. 543.

✦ ✦ ✦

## Utilizing Substandard Wire

RECENTLY the Signal Corps of the Army Service Forces was informed that there were 6,135 miles of substandard field wire on hand in various factories. Since the field wire used by the Army's communications men must pass the highest tests to withstand every conceivable type of weather, terrain and battle, it seemed that this quantity of critical copper and steel wire could only be melted down for scrap metal. But each length of wire was insulated with rubber, and this would be lost if the wire were scrapped.

✦ ✦ ✦

STUDIES were made to ascertain the possible military or commercial use and value of this wire. As a result, many uses of a non-combat nature were found. 1,500 miles will be used by Signal Corps soldiers training within this country. Several thousand miles are being taken over by ground force training units. More than 1,000 miles are being used commercially as duct, drop and distributing wire.

✦ ✦ ✦

IN this way the Signal Supply Services were able to utilize wire that otherwise might have been a loss.

✦ ✦ ✦

## Driver-Harris Gets "E" Award

THE Driver-Harris Company and its organization were given the Army-Navy Production Award and "E" Flag in appropriate ceremonies held at their plant in Harrison, New Jersey. The Company manufactures nickel alloys in the form of rods, wire, strip and castings.


**Use APEX "PIC-KLEEN"**
on
High and Low Carbon
RODS and WIRE

**"Pic-Kleen" saves time and money in cleaning-house practice by:**

1. **Cutting lime consumption**
2. **Eliminating sull-coating**
3. **Inhibiting rust in storage**
4. **Conserving dies & lubricants**
5. **Reducing handling costs**

COSTS LITTLE — SAVES MUCH

*A Proven Product Now in General Use in Mills*

Send for full information

**APEX ALKALI PRODUCTS COMPANY**
Main and Rector Streets
PHILADELPHIA, PA.



**GOOD PLATING STARTS WITH GOOD CLEANING!**

Take cadmium plating of springs or similar products as an example. You can get this job off to a flying start by removing ALL deposits that impair plate adhesion, cause blistering or other troubles.

By employing anodic degreasing or still-tank cleaning with a recommended Oakite material, you remove deposits thoroughly, speedily. Surfaces are left in the CHEMICALLY CLEAN condition required for durable, corrosion-resistant cadmium plated finishes! Write for details.

OAKITE PRODUCTS, INC.
52A THAMES ST., NEW YORK 6, N. Y.
*Technical Service Representatives Located in All Principal Cities of the United States and Canada*

OAKITE
MATERIALS METHODS SERVICE
Buy Bonds for Victory

# NILSON

AUTOMATIC PRESS
AND
FOUR SLIDE MACHINE

FOR SWAGING, STAMPING, PIERCING, BLANKING, FORMING OF COILED METAL

WE also build machines for forming Paper Clips, Buckles, Gate Hooks, Coat and Hat Hooks, Ceiling Hooks, Wire Ears, Cable Rings, Screw Eyes, Sash Chains, Automobile Side Chains, Flat Open Link Chains, Staples, Cotter Pins, Hose Clamps, Etc., and Wire Straighteners, Wire Reels, Frame Bending Machines and Special Presses.

For Complete Details Address —

## THE A. H. NILSON MACHINE CO.

BRIDGEPORT, CONN., U. S. A.

---

## WIRE INSULATING, STRANDING AND CABLING MACHINERY

## NEW ENGLAND BUTT COMPANY

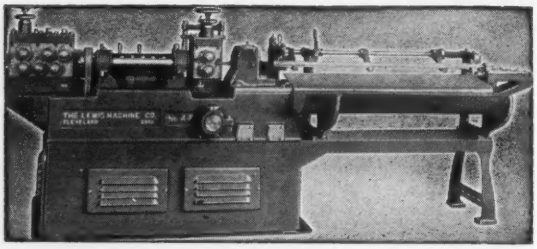
Office and Factory
304 PEARL ST., PROVIDENCE, R. I.

We build a complete line of Stranding Machines, Cabling Machines, Closing Machines, Rubber Strip Covering Machines, Measuring Machines, and Other Allied Machines for the Wire Trade.

LET US ESTIMATE ON YOUR NEEDS

---

## LEWIS TRAVEL-CUT WIRE STRAIGHTENING and CUTTING Machines



Machines for 1/16" to ¾" rod

Round
Square
Flat
Hexagon
Ferrous and Non-Ferrous

Automatic
High Speed
Heavy Duty

The Sign of Dependable Service:

WE CAN SUPPLY AND ENGINEER OUR TOOLS EQUIPPED WITH CARBOLOY CEMENTED CARBIDE

THE LEWIS MACHINE CO., 3445 E. 76 St., Cleveland, Ohio

---

Manufacturers of materials, tools and equipment for wire drawing and forming plants are constantly making improvements and additions to their lines. If you do not find the product or service in which you are interested, additional information will be supplied promptly. Simply address:

## WIRE & WIRE PRODUCTS

Stamford Trust Co. Bldg.,
300 Main St. Stamford, Conn.


### Metal Industry Will Meet in Chicago

(*Continued from Page 460*)

business, new ideas and developments will be brought together by manufacturers participating in the Conference Displays and thus aid in increasing the production of war products.

✦ ✦ ✦

"DESIGNED to meet wartime travel and transportation conditions", Mr. Eisenman concluded, "this year's meeting will help work out the problems of the metal industry with immense savings of time and travel, and will materially assist in maintaining war production at high levels."

✦ ✦ ✦

FOUR big national societies will again cooperate in the forthcoming Metal Congress. In addition to the American Society for Metals, there will be the American Welding Society, the Wire Association and the Iron and Steel and Metals divisions of the American Institute of Mining and Metallurgical Engineers.

✦ ✦ ✦

WAR Conference Displays and the sessions of the American Society for Metals will be concentrated in the Palmer House, with the American Welding Society at the Morrison Hotel, the Wire Association at the LaSalle, and the A.I.M.E. at the Sherman.

✦ ✦ ✦

THE Conference Displays will be located in the special rooms designed for light displays in the Palmer House. Far different from anything in the past, these rooms will accommodate light equipment and metal parts. Manufacturers are urged to use models, moving pictures, photographs and literature to present new developments to the industry.

✦ ✦ ✦

HOWEVER, there will be no changes in basic facilities that will enable engineers, executives and production men to get together in one convenient and coordinated meeting-place to help solve mutual problems and to bring to the attention of all the developments of the year in the metal industry.

### New Folders By Firth

THE Firth-Sterling Steel Company of McKeesport, Pa., has issued four four-page leaflets, punched for binding in a reference file entitled: 1. HWD Hot Work Die Steel, giving the composition, characteristics, applications and other data relating to these dies; 2. Sterling Stainless Steels, in which physical properties and working data of their Types "A" and "B" stainless steels are described; 3. This is a similar booklet on stainless steels Types "T" and "FC" and 4. A booklet describing their stainless "18-8", "18-8-F-C" and "18-8-S" steels. These are the chrome nickel group.

✦ ✦ ✦

ALL booklets are fully illustrated. If interested in any or all of these, the Company will be glad to send them upon request.

✦ ✦ ✦

### Wickwire Spencer Awarded Gold Star at Palmer

WICKWIRE Spencer Steel Company has received its first gold star for its Palmer, Mass., wire rope plant from the United States Maritime Commission. This plant last October received from the commission the first Maritime "M" awarded to any plant in New England and at that time "M" badges were given to the plant's 1,500 employees.

✦ ✦ ✦

IN recognition of continued outstanding production achievement **Admiral H. L. Vickery** notified **E. C. Bowers**, president, that the company should add a gold star to the Maritime "M" burgee and that the "M" badge would be awarded to 325 additional employees.

✦ ✦ ✦

WIRE rope manufactured at Palmer is used extensively in the rigging of Liberty ships as well as for other naval and hundreds of industrial purposes bearing indirectly on war production.


*Wartime*

**Wire for a thousand uses**

Versatile Continental wire is produced in sizes from 34 gauge to ⅝ inch, in standard and special shapes . . . and in a wide range of analyses, tempers and coatings.

CONTINENTAL STEEL CORP., KOKOMO, INDIANA
*(The Superior Sheet Steel Co., Canton, Ohio — a subsidiary)*

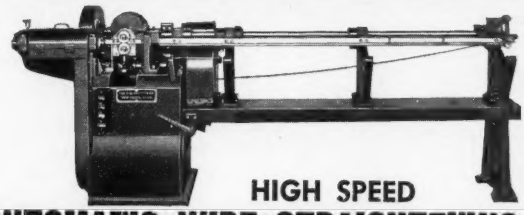
CONTINENTAL STEEL CORPORATION ★ SUPERIOR WIRE

CONTINENTAL SUPERIOR STEEL

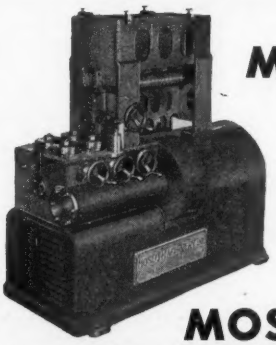
**CONTINENTAL STEEL CORPORATION**

SHEETS: Black, Galvanized, Copperior, Hot and Cold Rolled, Special Coated, Long Terne, etc

WIRE: Bright Basic, Annealed, KONIK, Copperized, Tinned, Special Manufacturer's, etc.



HIGH SPEED
**AUTOMATIC WIRE STRAIGHTENING & CUTTING MACHINES**
made in many sizes and lengths
**THE F. B. SHUSTER CO. NEW HAVEN, CONN.**



IF YOU MISSED SEEING
**MOSLO'S WELDING ROD**
**PROCESSING DEMONSTRATION**

Write for our folder describing the complete welding rod processing plant and picturing individual welding rod processing machines made by Moslo.

***Everything for the manufacture of welding rods.***

**MOSLO MACHINERY CO.**
2443 PROSPECT AVENUE CLEVELAND, OHIO

*Manufacturers of*

**MUSIC WIRE--ALL SIZES**

Stainless Steel — High Carbon — Silver Nickel
Aircraft Cable & Field Telephone Wire
Wire Straightened and cut to length
All types of wire redrawn to specifications

**JERSEY STEEL & WIRE CORP.**
84 COIT STREET - - - IRVINGTON, N. J.
Tel. Essex 2-0800

**VIANNEY**

Famous Wire Drawing Diamond Dies

These famous Diamond Dies are now produced here at moderate prices.

All sizes are in stock or made to order to your specifications

**VIANNEY WIRE DIE WORKS**

250 E. 43rd St., New York.
V. J. Boulin, Manager

---

DIAMOND CARBIDE
DIES
**KELLY**
WIRE DIE CORPORATION
19 W. 34th St. New York

---

**DIAMOND DIES**
.000's to .102
**Fort Wayne Wire Die, Inc.**
2625 E. Pontiac St. Fort Wayne, Ind.

---

**DIAMOND AND CARBIDE WIRE DRAWING DIES**
RUSCH WIRE DIE CORPORATION
275 Seventh Ave., New York, N. Y.

---

**DIAMOND WIRE DRAWING DIES**
INDIANA WIRE DIE COMPANY
2234 Holton Ave.
Fort Wayne, Indiana


## Safety Regulations for Lathe Operators

TWENTY regulations for safe operation of lathes are contained in a small pamphlet prepared for distribution by foreman to lathe operators at General Electric's Schenectady Works. The front of the pamphlet carries the admonition: "If you don't know the safe way, stop and find out. It's a lot easier to do things right than wrong — and a whole lot safer."

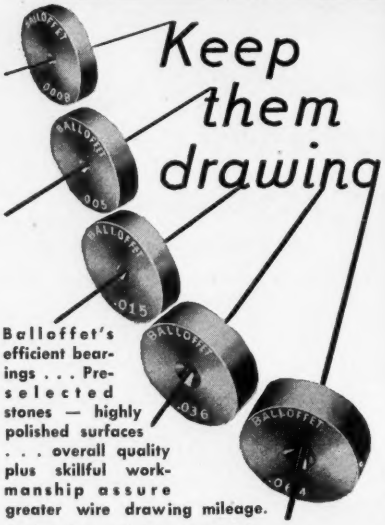
✦ ✦ ✦

THE twenty regulations, approved by the Works' Safety Committee, are as follows:

**BEFORE STARTING LATHE**

1. If there are red, green, or yellow tags on the machine, do not move the control handle or switch.
2. Use a soft hammer to hit hardened tools—never a hardened hammer.
3. Put chuck or face plate on lathe spindle by hand, not by starting the lathe.
4. Remove chuck wrenches from chuck before starting lathe.
5. Make sure setscrews do not project from rotating parts.


**Balloffet DIAMOND DIES**




Balloffet's efficient bearings . . . Pre-selected stones — highly polished surfaces . . . overall quality plus skillful workmanship assure greater wire drawing mileage.

*Quality Diamond Dies since 1870*

**BALLOFFET DIES AND NOZZLE CO., INC.**
68-25 Adams at 68th Street
Guttenberg, New Jersey

---

DIAMOND WIRE DRAWING
**DIES**
Compare Quality and Prices and You'll Specify "AJAX"
**AJAX INDUSTRIAL SUPPLIES, INC.**
226 E. Columbia St. Fort Wayne, Ind.
Telephone: E 3126

---

**DIAMOND WIRE DRAWING DIES**
LUGINBILL WIRE DIE CO.
3410 Fairfield Ft. Wayne, Ind.

---

**For the Finest DIAMOND WIRE DRAWING DIES**

*Look for the mark* **W.W.D. CO.**

*Particulars and Prices on Request*

What do you want in diamond dies? Diamonds of best quality; workmanship that is accurate; and dies that will give the utmost in life and the highest flawless output of wire.

Every WAYNE die will meet these requirements. Use WAYNE dies to cut your costs. Least expensive in the long run.

*Users of* WAYNE *dies state that "they are best value obtainable".*

**Wayne Wire Die Company** 200 PENNSYLVANIA AVE., HILLSIDE, N. J.
Telephone: ELizabeth 2-2456

---

**Wire Drawing Diamond Dies**

**COCHAUD**
**WIRE DIE CORPORATION**
300 W. 56th St., NEW YORK
Tel. Col. 5-1340

**GEORGE D. HARTLEY**

**CONSULTANT & SPECIALIST**

In Wire Manufacturing & Wire Forming Equipment

Development & Research
New Processes — Designing
Inventions — Patents

372 MAY ST., WORCESTER 2, MASS.

**KENNETH B. LEWIS**
**CONSULTING ENGINEER**

Wire Mill Equipment, Layout and Practice

43 Midland St., Worcester, Mass.
Phone: Worcester 5-6033

CONSULTANT AND SPECIALIST

**DRAWING LUBRICANTS**

**Hans C. Bick, Inc.**

READING, PA.

**SCOTT TESTERS**

*Registered Trademark

60 Models for WIRE, RUBBER, TEXTILES, PAPER, ETC.

**HENRY L. SCOTT CO.**

55 Blackstone St. Providence, R. I.

*Standard of the World*

**TORRINGTON SPRING COILERS**

13 models in both segment and clutch types for rapid, automatic, accurate production using wire diameters .003" to .500". Torsion and other attachments available for increasing utility of Torrington Coilers.

**The TORRINGTON MANUFACTURING CO.**
TORRINGTON, CONNECTICUT

WIRE MILL **FURNACES** FUEL & ELECTRIC

For Rolling and Annealing Ferrous and Non-Ferrous Metals

**W. S. ROCKWELL Co.**

50 Church St. New York


6. Before starting lathe, see that all guards which have been removed are replaced.

7. Operators must not remove or make ineffective any safeguards unless specifically authorized to do so by the foreman.

8. Loose clothing, hair, neckties, long sleeves, and wiping rags might catch in revolving work. Wear proper clothing and exercise great caution when working with revolving machinery.

9. Always remove tailstock center when not in use.

**WHILE LATHE IS IN MOTION**

10. Never attempt to change speed of an engine lathe while spindle is in motion.

11. Beware of sharp burrs on chips or spiral chips which may snap around.

12. Make sure all files are equipped with handles.

13. When using emery cloth on revolving work, be careful that the cloth does not overlap. This can be avoided by applying the emery cloth with a flat file or piece of wood.

14. Use a brush, hook, or special tool to remove chips.

15. Do not use a micrometer on revolving work.

16. When grinding or turning brass, textolite, or any material which may release flying particles, safety goggles should be worn.

17. Stop lathe when oiling, cleaning, or repairing it. Open the switch when making adjustments.

18. Do not stop lathe chuck with hand.

19. When a heavy chuck is on the lathe, do not stop the spindle suddenly or the chuck may fly off.

20. Do not leave the lathe in motion unattended.


**DAVIS SPARKERS**

**R. L. DAVIS ELECTRIC CO.**
340 Center Street,
Wallingford, Conn.

MANUFACTURERS OF
WIRE BRAIDING — SPOOLING — TAPING
WINDING AND SPECIAL MACHINES
SINFRA WIRE COVERING MACHINES

**FIDELITY MACHINE CO.**
3908-18 Frankford Ave., Phila., Pa.

**FOR SALE**

Have one 600-ton and two 1000-ton and one 2100-ton Robertson Lead Presses for disposal. Apply Box #343 c/o
WIRE & WIRE PRODUCTS

Wire drawer with 30 years' experience in the manufacture and sale of high and low Carbon Steel, Monel Metal, Pure Nickel, and Nickel Chrome Alloys, Open for Position as Superintendent or Dept. Supervisor.

Apply Box 356 c/o
WIRE & WIRE PRODUCTS

**WELL ESTABLISHED MANUFACTURER**

of Strip Cold Rolling Equipment and Wire Mill Machinery has opening for a man experienced in the processing and cold rolling of narrow strips and wire drawing. Should be able to make outside contacts regarding equipment requirements for post war period.
If employed now in essential war job and not available immediately, change could be deferred until a later date.
Applicants please give full details as to past experience and ability in the sales engineering field. Apply Box #357 c/o
WIRE & WIRE PRODUCTS

Lead Press Wanted: 2100 tons, 30 inch ram, complete with cylinder, lead pot, die blocks, pump and motor including take-up. Must be in good operating condition. Apply Box #358 c/o WIRE & WIRE PRODUCTS

**WIRE MACHINERY SPECIALISTS**

3—Nilson No. 1, 3 & 4 4 Slide Wire Machines
5—Baird No. 4—Four Slide Wire Machines
7—Waterbury Step Cone Wire Drawing Machines
1—Two Spindle Bull Block Motor Driven
6—Lewis Welding Wire S. & C. Machines M. D.
2—Shuster Shaped Wire S. & C. Machines ½" & ⅝" Square, Hexagon & Round Stock Capacities
8—Shuster Round Wire Straightening & Cutting Machines 1/32"-½"
Wanted: Tack Making Machinery. All Sizes.

**NATIONAL MACHINERY EXCHANGE**
128-138 MOTT ST. NEW YORK, N. Y.

**SLEEPER & HARTLEY, Inc.**
*Designers and Builders*

SPRING COILERS
WIRE WORKING MACHINERY
WIRE MILL EQUIPMENT
SPECIAL MACHINERY

*Address Inquiries to*
Box 1249
WORCESTER, MASS

**EYELETS**
ZINC WIRE
ZINC STRIP
THE PLATT BROS. & CO.
WATERBURY, CONN.

Designers and Builders of Gas-Fired Heat Treating Furnaces for Ferrous and Non-Ferrous Wire.
**SURFACE COMBUSTION**
Main Plant & General Offices - Toledo, Ohio

**RUESCH**
Machinery For
Wire, Tube, and Brass Mills
409 Mulberry St., Newark, N. J.

WIRE DRAWING MACHINERY AND EQUIPMENT
Rod Frames — 16" Frames, 8" Frames — Take-Up Frames, Wire Pointers — Puller Tongs.
General and heat resisting alloy castings for wire mill use.
Circulars on Request.
E. J. SCUDDER FOUNDRY & MACHINE CO.
TRENTON, N. J.

**BRODEN**
*Wire Mill and Cold Rolling Equipment*
Broden Construction Co.
22800 Lakeland Blvd.
CLEVELAND, OHIO

WIRE SPOOLING MACHINERY
and
SPECIAL MACHINERY
Address inquiries to
ROBERT J. EMORY COMPANY
Sherman Ave & Runyon St.
Newark, N. J.

**APCO MOSSBERG CO.**
the original Frank Mossberg Co.
Manufacturers of Reels and Spools
Attleboro, Mass.

*CLEVELAND TRAMRAIL*
Division of
THE CLEVELAND CRANE & ENGINEERING CO.
WICKLIFFE, OHIO
Leading manufacturers of
OVERHEAD MATERIALS HANDLING EQUIPMENT
*for the Wire and Wire Products Industry*

## Industrial Films On Gage Blocks

FOUR new 35 MM sound slide films describing the use of Gage Blocks are now available. These give a presentation lasting over an hour and a half on the following subjects:

1. Theory of Gage Blocks
2. How Gage Blocks are Used
3. How Gage Blocks are Made
4. The Use of Gage Instruments

✦ ✦ ✦

THE films are designed to remove the "mystery" and misunderstanding prevalent in industry about modern gage blocks and are instructive to any person engaged in plant operation, inspection or in actual shop work.

✦ ✦ ✦

THE entire history of how Gage Blocks came into being is graphically shown by a complete portrayal of the evolution of our modern system of measurement. The discovery of the constancy and uniformity of light waves, which finally gave man a permanent basis on which to base the formerly arbitrary units of length, is presented in a clear and understandable manner.

✦ ✦ ✦

THE film entitled, "How Gage Blocks are Used," shows the proper care of these unbelievably accurate gages as well as the manifold uses for them in actual machining operation, as well as the multitude of applications in inspection and checking and semi-finished and finished work.

✦ ✦ ✦

THEY are offered for presentation before plant executives, foremen, inspectors, trade school classes, by the Savage Tool Company of Minneapolis, Minnesota, manufacturers of DOALL Gage Blocks and Gage Instruments, and will be loaned for free showing or can be purchased at cost for permanent use upon request written on company or school letterhead.

**AD THOUGHT**
**A magazine's editorial content and its ADVERTISING supplement each other. Each, in its way, informs readers of the time-tried and the new. Read both. Keep abreast of what's happening in your field. And as advertising revenues make possible editorial service PLEASE let advertisers know that you have seen their ads in WIRE & WIRE PRODUCTS.**

WATERPROOF
and
CREPE PAPER
in rolls of any size for wrapping coils and reels.
CREPE-KRAFT BARREL LINERS
THE CREPE-KRAFT COMPANY
Tel.: Market 2-0375
112 Adams St. Newark, N. J.

ACID PROOF BRICK
for
Pickling Tank Construction
Toronto Acid Brick
KEAGLER BRICK COMPANY
STEUBENVILLE, OHIO

**RIEHLE**
**TESTING MACHINES**
MORE ACCURATE, MORE DEPENDABLE FOR PRODUCTION CHECK TESTING
Division of American Machine and Metals, Inc.
East Moline, Illinois

Annealing Pots and Boxes
Galvanizing Kettles
Lead and Spelter Pans
Pressure Vessels
NATIONAL ANNEALING BOX CO.
Established 1895
Washington, Penna.

WIRE, WIRE ROPE AND ELECTRIC CABLE MACHINERY
NATIONAL
WIRE MACHINERY COMPANY
Lynn, Mass.
Successors to
Thomson-Judd Wire Machinery Company
Write for Catalogue

HAVEG CORPORATION
NEWARK, DELAWARE
•
Manufacturers of Plastic Chemical Equipment

MACHINES FOR THE LINEAR MEASUREMENT OF WIRE
Patented and Exclusive "3V" Principle Provides New Standard of Accuracy
LYON-VAIL MACHINE CO., INC.
97 Belmont St. Brockton, Mass.

*Wire Measuring*
**PRODUCTIMETERS**
Precision-built for accuracy and speed. Most complete line offered.
*SEND FOR CATALOG No. 3*
DURANT MANUFACTURING CO.
1918 N. Buffum St. Milwaukee, Wis.
176 Eddy Street Providence, R.I.

# Index To Advertisers


A

Ajax Industrial Supplies, Inc. ..... 486
American Chemical Paint Co. ..... 441
American Insulating Machinery Co. ..... 454
Apco Mossberg Co. ..... 488
Apex Alkali Products Co. ..... 482-483

B

Balloffet Dies & Nozzle Co., Inc. ..... 486
Bethlehem Steel Co. ..... 434
Bick, Hans C., Inc. ..... 487
Broden Construction Co., The ..... 488

C

Callite Tungsten Corp. ..... 480
Carboloy Company, Inc. ..... 433
Carl-Mayer Corp., The ..... 471
Carter, B. & F., Co., Ltd. ..... 475
Cleveland Tramrail Div. of Cleveland Engineering Co. ..... 488
Cochaud Wire Die Corp. ..... 486
Continental Steel Corp. ..... 485
Crepe-Kraft Co., The ..... 488

D

Davis, R. L., Electric Co. ..... 487
Durant Mfg. Co. ..... 488

E

Electric Furnace Company ..... Back Cover
Emory, Robert J., Co. ..... 488

F

Fidelity Machine Co. ..... 487
Firth-Sterling Steel Co. ..... 446
Fort Wayne Wire Die, Inc. ..... 486

G

Gilron Products Co., Inc. ..... 481
Glader, Wm., Machine Works ..... 478

H

Hartley, Geo. D. ..... 487
Haveg Corp. ..... 488
Hubbard Spool Company ..... 469

I

Indiana Wire Die Co. ..... 486
Industrial Oven Engr. Co. ..... 473

J

Jersey Steel & Wire Corp. ..... 485
Jones & Laughlin Steel Corp. ..... 440

K

Keagler Brick Co. ..... 488
Kelly Wire Die Corp. ..... 486
Keystone Steel & Wire Co. ..... 465

L

Lancaster, Allwine & Rommel ..... 483
Lewis, K. B. ..... 487
Lewis Machine Co., The ..... 484
Luginbill Wire Die Co. ..... 486
Lyon-Vail Machine Co., Inc. ..... 488

M

Micro Products Co. ..... 462
Morgan Construction Co. ..... Front Cover
Morrison Engineering Corp. ..... 476
Moslo Machinery Co. ..... 485
Mossberg Pressed Steel Corp. ..... 472

N

National Annealing Box Co. ..... 488
National Machinery Exchange ..... 487
National Wire Machinery Co. ..... 488
New England Butt Co. ..... 484
Niagara Blower Company ..... 467
Nilson, A. H., Machine Co. ..... 484
Norton Company ..... 443

O

Oakite Products, Inc. ..... 483
O'Neil-Irwin Mfg. Co. ..... 481

P

Platt Bros. & Co., The ..... 488
Porter, H. K., Inc. ..... 466

R

Riehle Testing Machine Div. of American Machine & Metals, Inc. ..... 488
Robertson, John, Co., Inc. ..... 435
Robinson Mfg. Company ..... 468
Rockwell, W. S., Co. ..... 487
Ross, J. O., Engineering Corp. ..... 464
Royle, John & Sons ..... 437
Ruesch, H. J., Machine Co. ..... 488
Rusch Wire Die Corp. ..... 486

S

Scott, Henry L., Co. ..... 487
Scudder, E. J., Foundry & Machine Co. ..... 488
Shuster, F. B., Co. ..... 485
Sleeper & Hartley, Inc. ..... 487
Standard Industrial Compounds Co. ..... 463
Standard Machinery Company ..... 480
Stevens Metal Products Co., The ..... 445
Surface Combustion Div. of General Properties Co., Inc. ..... 488
Syncro Machine Co. ..... 442

T

Thropp, Wm. R. & Sons Co. ..... 479
Torrington Mfg. Co., The ..... 487
Tungsten Electric Corp. ..... 477

V

Vascoloy-Ramet Corp. ..... 436
Vaughn Machinery Co. ..... Inside Front Cover
Vianney Wire Die Works ..... 486

W

Warner Co. ..... 482
Waterbury-Farrel Fdry. & Machine Co. ..... 444
Watson Machine Co. ..... 474
Wayne Wire Die Co. ..... 486
Willey's Carbide Tool Co. ..... 479
Winsted Div., Hudson Wire Co. ..... Inside Back Cover


# WHERE TO BUY

**For more complete information, consult the annual Wire and Wire Products Directory, Index & Buyers' Guide.**

**ABRASIVES—**
Norton Co., Worcester, Mass.

**ACID INHIBITORS—**
American Chemical Paint Co., Ambler, Pa.

**AIR DRAW FURNACES—**
Carl-Mayer Corp., The, Cleveland, Ohio.

**ALKALINE CLEANERS—**
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

**ANNEALING MACHINES—Open Flame**
Syncro Machine Co., Rahway, N. J.

**ANNEALING POTS AND BOXES—**
National Annealing Box Co., Washington, Penna.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.

**ARMORING EQUIPMENT—**
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

**BAKERS—Hi-Speed**
Carl-Mayer Corp., The, Cleveland, Ohio.

**BAKERS—Rod and Wire**
Carl-Mayer Corp., The, Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Moslo Machinery Co., Cleveland, Ohio.
Ross, J. O., Engineering Corp., New York, N. Y.

**BENDERS—**
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

**BOBBINS—Braider and Wire Weaving**
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

**BORON CARBIDE—**
Norton Co., Worcester, Mass.

**BRAKES & SHEARS—**
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

**BRICKS—Acid Proof**
Keagler Brick Co., Steubenville, Ohio.

**CABLE LACQUERING OVENS**
Industrial Oven Engr. Co., Cleveland, Ohio.

**CARRIERS—Braider, High Speed**
Apco Mossberg Co., Attleboro, Mass.
Carter, B. & F., & Co., Ltd., Bolton, England.
Mossberg Pressed Steel Corp., Attleboro, Mass.

**CEMENTS—Refractory**
Norton Co., Worcester, Mass.

**CHEMICALS—Cleaning**
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

**CLEANERS—Hand and Metal**
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

**CLEANING & PICKLING EQUIPMENT—**
Broden Construction Co., Cleveland, O.

# WHERE TO BUY, Continued

Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Haveg Corporation, Newark, Del.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**CLOTH TESTERS—**
Scott, Henry L., Co., Providence, R. I.

**CLOTH—Wire, All Metals**
Callite Tungsten Corp., Union City, N. J.

**COATING COMPOUNDS—**
Apex Alkali Products Co., Philadelphia, Pa.
Gilron Products Co., Cleveland, Ohio
Standard Industrial Compounds Co., Chicago, Ill.

**COILERS—Sheet, Strip and Wire**
Broden Construction Co., Cleveland, O.
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

**COLD HEADERS—**
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

**COMPOUNDS—Coppering**
American Chemical Paint Co., Ambler, Pa.

**COMPOUNDS—Metal Finishing**
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

**COMPOUNDS—Rust Preventing**
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

**COMPOUNDS—Rust Removing**
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

**COMPOUNDS—Wire Drawing**
Apex Alkali Products Co., Philadelphia, Pa.
Gilron Products Co., Inc., Cleveland, Ohio.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

**CONTROLS—Heat Treating**
Niagara Blower Co., Buffalo, N. Y.

**CONTROLS—Temperature**
Niagara Blower Co., Buffalo, N. Y.

**COPHOLDERS—Steel**
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

**CRANES—Wire Mill**
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**CUTTING TOOLS—Carbide**
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Vascoloy-Ramet Corp., North Chicago, Ill.

**CUTTING TOOLS—Wire**
Porter, H. K., Inc., Everett, Mass.

**DIAMONDS—Industrial**
Callite Tungsten Corp., Union City, N. J.

**DIAMOND POWDERS—**
Rusch Wire Die Corp., New York, N. Y.

**DIAMOND TOOLS—**
Rusch Wire Die Corp., New York, N. Y.

**DIE MAKING MACHINERY — For Forming Special Shapes**
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

**DIES—Diamond**
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Corp., New York, N. Y.
Fort Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

**DIES—Lead Extrusion**
Robertson, John, Co., Brooklyn, N. Y.

**DIES—Repairs & Re-Cutting**
Ajax Industrial Supplies Co., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Cochaud Wire Die Corp., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Fort Wayne Wire Die, Inc., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

**DIES—Rod and Tube Drawing**
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

**DIES—Tantalum Carbide**
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

**DIES—Tungsten Carbide**
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

**DRAW BENCHES—**
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I.
Vaughn Machinery Co., Cuyahoga Falls, O.

**DRUMS—Flange Steel**
Stevens Metal Products Co., Niles, O.

**DRUMS—Vulcanizing**
Mossberg Pressed Steel Corp., Attleboro, Mass.

**DRYING EQUIPMENT—**
Niagara Blower Co., Buffalo, N. Y.

**ENGINEERS—Consulting Wire Mill**
Hartley, George D., Worcester, Mass.
Lewis, Kenneth B., Worcester, Mass.

**EQUIPMENT—Humidifying**
Niagara Blower Co., Buffalo, N. Y.

**EQUIPMENT—Industrial Cooling**
Niagara Blower Co., Buffalo, N. Y.

**EQUIPMENT—Insulation Testing**
Davis, R. L., Electric Co., Wallingford, Conn.

**EYELETS—Brass or Zinc**
Platt Bros. & Co., The, Waterbury, Conn.

**FLUXES—Soldering**
American Chemical Paint Co., Ambler, Pa.

**FOAM PRODUCING COMPOUNDS—**
American Chemical Paint Co., Ambler, Pa.

**FURNACES—Annealing**
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

**FURNACES—Automatic**
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

**FURNACES—Brazing**
Electric Furnace Co., Salem, O.
Firth-Sterling Steel Co., McKeesport, Pa.

**FURNACES—Bright Annealing**
Electric Furnace Co., Salem, O.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

**FURNACES—Electric**
Electric Furnace Co., Salem, Ohio
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

**FURNACES—Hardening & Tempering**
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

**FURNACES—Lead Melting**
Electric Furnace Co., Salem, Ohio
Robertson, John, Co., Brooklyn, N. Y.

**FURNACES—Non-Oxidizing**
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

**FURNACES—Normalizing**
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Rockwell, W. S., Co., New York, N. Y.

**FURNACES—Salt Bath**
Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

**FURNACES—Wire, Strip & Sheet**
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

**GALVANIZING KETTLES—**
National Annealing Box Co., Washington, Penna.

**GRINDERS—Roll**
Norton Co., Worcester, Mass.

**HI-SPEED BAKERS—**
Carl-Mayer Corp., The, Cleveland, Ohio

**HOISTS—Electric Travelling**
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

**INHIBITORS—**
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

**KETTLES—Galvanizing, Annealing, Tinning, etc.**
National Annealing Box Co., Washington, Penna.

**LATHES—Die Reaming**
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**LIME—**
Warner Co., Bellefonte, Pa.

**LUBRICANTS—For Metal Cutting, Stamping and Drawing**
Apex Alkali Products Co., Philadelphia, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

**LUBRICANTS—Wire Drawing**
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

**MACHINERY—Armoring (Cable, Wire Hose)**
American Insulating Mach'y. Co., Phila., Pa.
National Wire Machinery Co., Lynn, Mass.
New England Butt Co., Providence, R. I.
Robertson, John, Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Braiding**
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Brazing**
National Wire Machinery Co., Lynn, Mass.

**MACHINERY—Bunching**
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Bundling, Scrap**
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Cable, Electric**
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
National Wire Machinery Co., Lynn, Mass.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Chain Making**
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Closing**
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Coil Winding**
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

**MACHINERY—Coilers**
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

# WHERE TO BUY, Continued

Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Copper Wire Drawing and Rolling**
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

**MACHINERY—Covering Wire**
Fidelity Machine Co., Philadelphia, Pa.
Syncro Machine Co., Rahway, N. J.

**MACHINERY—Cutting**
Broden Construction Co., Cleveland, Ohio
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery, Inc., Cleveland, Ohio
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.

**MACHINERY—Die Making**
Firth-Sterling Steel Co., McKeesport, Pa.

**MACHINERY — Die Making for Forming Special Shapes**
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

**MACHINERY—Draw Benches**
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

**MACHINERY—Edging**
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

**MACHINERY—Enameling**
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

**MACHINERY—Extruding**
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.
Thropp, Wm. R., & Sons Co., Trenton, N. J.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Flat Wire**
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

**MACHINERY—Forming**
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

**MACHINERY—Galvanizing Wire**
Broden Construction Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Gang Winders**
Fidelity Machine Co., Philadelphia, Pa.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Grinding**
Norton Co., Worcester, Mass.

**MACHINERY—Hydraulic Testing**
Riehle Testing Machine Div. of American Machine & Metals, Inc., East Moline, Ill.

**MACHINERY—Insulating**
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Knitting**
Fidelity Machine Co., Philadelphia, Pa.

**MACHINERY—Lead Encasing Presses, etc.**
Robertson, John, Co., Brooklyn, N. Y.

**MACHINERY—Lead Stripping**
Robertson, John, Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Lock Washer**
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

**MACHINERY—Magnet Wire**
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.

**MACHINERY—Material Handling**
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

**MACHINERY — Measuring Wire & Cable**
Davis, R. L., Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Brockton, Mass.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Nail and Tack**
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Panning**
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

**MACHINERY—Pointing**
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

**MACHINERY—Quill Winding**
Fidelity Machine Co., Philadelphia, Pa.

**MACHINERY—Rod Mill**
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.

**MACHINERY—Rolling Mill**
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

**MACHINERY—Rubber for Insulating Wire**
Royle, John, & Sons, Paterson, N. J.

**MACHINERY—Rubber Strip Covering**
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Rubber Tubing and Straining**
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Rubber Working, Mills, Calendars, etc.**
Thropp, Wm. R., & Sons Co., Trenton, N. J.

**MACHINERY—Screw Wire**
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Special**
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Emory, Robert J., Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I. (Special Designs)
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Spooling**
American Insulating Mach'y Co., Phila., Pa.
Emory, Robert J., Co., Newark, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Spring Making**
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

**MACHINERY—Staple**
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Straightening**
Broden Construction Co., Cleveland, Ohio
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Shuster, F. B., Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

**MACHINERY—Stranding**
National Wire Machinery Co., Lynn, Mass.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Strip Steel**
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

**MACHINERY—Swaging**
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

**MACHINERY—Taping**
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
National Wire Machinery Co., Lynn, Mass.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Testing**
Riehle Testing Machine Div., of American Machines & Metals, Inc., East Moline, Ill.
Robinson Mfg. Co., Muncy, Pa.
Scott, Henry L., Co., Providence, R. I.

**MACHINERY—Testing Size of Wire**
Davis, R. L., Electric Co., Wallingford, Conn.

**MACHINERY—Testing Spring**
Standard Machinery Co., Providence, R. I.

**MACHINERY—Tinsel Rolling Mills**
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.

**MACHINERY—Trolley Wire**
Vaughn Machinery Co., Cuyahoga Falls, O.
Torrington Mfg. Co., Torrington, Conn.

**MACHINERY—Tube Mill**
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

**MACHINERY—Welding Wire**
Micro Products Co., Chicago, Ill.
National Wire Machinery Co., Lynn, Mass.
Shuster, F. B., Co., New Haven, Conn.

**MACHINERY—Winding**
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Wire Bending**
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

**MACHINERY—Wire Drawing**
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
National Wire Machinery Co., Lynn, Mass.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

**MACHINERY—Wire Measuring**
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Inc., Brockton, Mass.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Wire Rope**
National Wire Machinery Co., Lynn, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Wire Tinning**
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.

**MACHINERY—Wood Screw**
National Machinery Exchange (Used), New York, N. Y.

# WHERE TO BUY, Continued

**MATERIAL HANDLING EQUIPMENT**
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

**MILLS—Tandem Rolling and Edging**
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

**NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip**
Hudson Wire Co., Ossining, N. Y.

**OILS—Wire Drawing**
Apex Alkali Products Co., Philadelphia, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

**OVENS—Cable Lacquering**
Industrial Oven Engr. Co., Cleveland, Ohio

**OVENS—Industrial**
Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Oven Engr. Co., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

**PAINTS—Heat Resisting**
American Chemical Paint Co., Ambler, Pa.

**PAINTS—Marine**
American Chemical Paint Co., Ambler, Pa.

**PAINTS—Structural Steel**
American Chemical Paint Co., Ambler, Pa.

**PANS—Lead and Spelter**
National Annealing Box Co., Washington, Penna.

**PANS—Vulcanizing**
Mossberg Pressed Steel Corp., Attleboro, Mass.

**PAPER—Creped Wrapping**
Crepe-Kraft Co., Newark, N. J.

**PAPER TESTERS—**
Scott, Henry L., Co., Providence, R. I.

**PATENT ATTORNEYS—**
Lancaster, Allwine and Rommel, Washington, D. C.

**PICKLING COMPOUNDS—**
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

**PIPES AND FITTINGS—Acid Resistant**
Haveg Corp., Newark, Del.

**PLASTIC TESTERS—**
Scott, Henry L., Co., Providence, R. I.

**POTS—Lead Melting**
Robertson, John, Co., Brooklyn, N. Y.

**POWDER—Wire Drawing**
Apex Alkali Products Co., Philadelphia, Pa.

**PRESSES—Hydraulic and Mechanical**
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Providence, R. I. (Mechanical Only)

**PRESSES—Lead**
Robertson, John, Co., Brooklyn, N. Y.

**PRESSURE VESSELS—**
National Annealing Box Co., Washington, Penna.

**PULLERS—Wire**
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

**PUMPS—Hydraulic**
Robertson, John, Co., Brooklyn, N. Y.

**QUENCHING BATH CONTROLS—**
Niagara Blower Co., Buffalo, N. Y.

**REEL AND TENSION STAND—**
Fidelity Machine Co., Philadelphia, Pa.
Moslo Machinery Co., Cleveland, Ohio
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

**REEL CRUTCHES—**
Watson Machine Co., Paterson, N. J.

**REELS—Annealing and Stranding**
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

**REELS—Steel**
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

**REELS AND SPOOLS—Shipping and Shop**
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

**REELS—Takeoff**
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

**REELS—Vulcanizing and Impregnating**
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

**REELS—Wire Drawing**
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

**REFRACTORIES—High Temperature**
Norton Co., Worcester, Mass.

**ROD BAKERS—**
Carl-Mayer Corp., The, Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

**RODS—Wire—Non-Ferrous**
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

**RODS—Wire—Steel**
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

**ROLL STRAIGHTENERS—**
Moslo Machinery Co., Cleveland, Ohio

**RUBBER AND RUBBER COMPRESSION TESTERS—**
Scott, Henry L., Co., Providence, R. I.

**RUST PROOF COMPOUNDS—**
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

**RUST REMOVING COMPOUNDS—**
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

**SHEARS—**
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

**SHEET—Steel**
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

**SOAPS—Industrial and Wire Drawing**
Apex Alkali Products Co., Philadelphia, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

**SPOOLS—Annealing and Wire Drawing**
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

**SPOOLS—Shipping and Shop**
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

**SPOOLS—Steel**
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

**STAMPINGS—Steel**
Hubbard Spool Co., Chicago, Ill
Mossberg Pressed Steel Corp., Attleboro, Mass.

**STRIP—Brass and Non-Ferrous**
Hudson Wire Co., Ossining, N. Y.

**STRIP—Steel**
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

**STRIP METAL TESTERS—**
Scott, Henry L., Co., Providence, R. I.

**SWIFTS—Take-off**
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

**TANK LININGS—Brick**
Keagler Brick Co., Steubenville, Ohio.

**TANKS—Compound**
Watson Machine Co., Paterson, N. J.

**TANKS—Pickling**
Haveg Corp., Newark, Del.

**TANKS—Steel**
Mossberg Pressed Steel Corp., Attleboro, Mass.

**TEMPERATURE CONTROLS—**
Niagara Blower Co., Buffalo, N. Y.

**TENSILE TESTERS—**
Scott, Henry L., Co., Providence, R. I.

**TESTING INSTRUMENTS—**
Riehle Testing Machine Div. of American Machine & Metals, Inc., East Moline, Ill.
Scott, Henry L., Co., Providence, R. I.

**TOOLS—Wire Cutting**
Porter, H. K., Inc., Everett, Mass.

**TRAMRAIL SYSTEMS—**
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

**TREADS—Safety**
Norton Co., Worcester, Mass.

**TRUCKS—**
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**TUBE BENDERS AND FORMERS—**
Ruesch, H. J., Machine Co., Newark, N. J.

**TURKS HEADS—Friction and Power Driven**
Standard Machinery Co., Providence, R. I.

**VALVES AND FITTINGS—Acid Resistant**
Haveg Corp., Newark, Del.

**VULCANIZERS—**
Watson Machine Co., Paterson, N. J.

**VULCANIZING PANS—**
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

**WELDERS—Spot and Butt**
Micro Products Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio

**WIRE—Cold Heading**
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

**WIRE—Electric**
Hudson Wire Co., Ossining, N. Y.

**WIRE—Enameled for Coils**
Winsted Div. of Hudson Wire Co., Winsted, Conn.

**WIRE—Manufacturers**
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

**WIRE—Music**
Jersey Steel & Wire Corp., Irvington, N. J.

**WIRE—Nickel Silver and Phosphor Bronze**
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.

**WIRE—Non-Ferrous to Specification for Special Purposes**
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

**WIRE—Spring**
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

**WIRE—Stainless Steel**
Callite Tungsten Corp., Union City, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.

**WIRE—Steel—Also Coppered Steel—Also Galvanized Steel**
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

**WIRE AND STRIP—Zinc**
Platt Bros. & Co., The, Waterbury, Conn.

**WIRE TESTERS—**
Scott, Henry L., Co., Providence, R. I.

**WIRE, WEAVING—Non-Ferrous**
Hudson Wire Co., Ossining, N. Y.

**WRAPPING PAPER—Creped**
Crepe-Kraft Co., Newark, N. J.

**YARN TESTERS—**
Scott, Henry L., Co., Providence, R. I.

# *for magnet wire products that must do the job!*

**ENAMELED COPPER**
**ENAMELED IRON**
**ENAMELED ALLOY**
**ENAMELED ALUMINUM**
**TWISTED MULTIPLES**
**PARALLEL MULTIPLES**

**SILK COVERED**
**COTTON COVERED**
**CELANESE COVERED**
**GLASS FIBRE COVERED**
**LITZENDRAHT AND**
**SPECIALS TO ORDER**

There's more to present day engineering and design problems than shortages of materials, priorities, etc. There is also the question of whether specifications have been rigidly adhered to. Wire, for example, must meet such requirements as specific electrical properties, flexibility, tensile strength, laying speed, uniformity, etc.

Whether it's a buyer's or a seller's market, WINCO magnet wire products are drawn to exact specifications. Uniformity of product is guaranteed by mercury process tests and careful supervision guards against variations in consistency, structure or electrical values.

If you have a wire problem, our complete facilities are at your disposal. Send blueprints or specifications for recommendations, without obligation. Samples sent on request; write today.

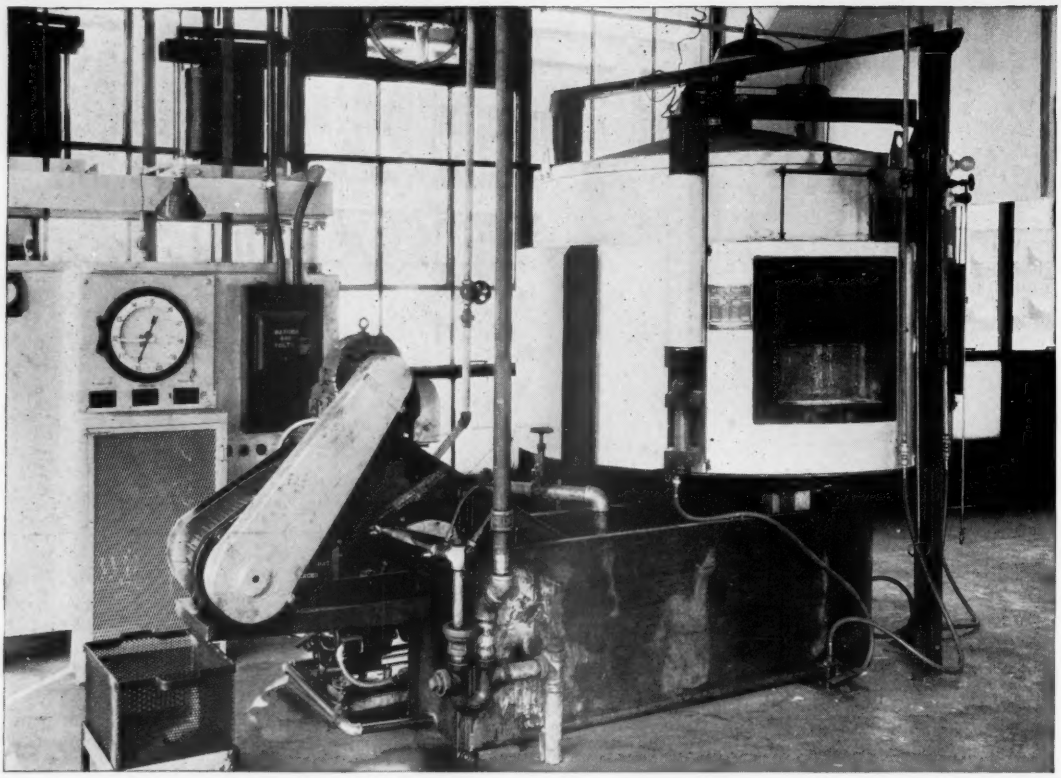
**WINSTED DIVISION**

HUDSON WIRE COMPANY

WINSTED — CONNECTICUT

# EF FURNACES

## For Every Industrial Heat Treating Process



## THESE SMALL EF SPECIAL ATMOSPHERE FURNACES HARDEN 250 LBS. PER HOUR - - SCALE FREE

While more widely known as "designers and builders of large production furnaces," The Electric Furnace Company also builds numerous types of smaller continuous automatic units.

These smaller furnaces incorporate the same expert engineering service and experience and the same ruggedness and refinements which characterize our larger installations.

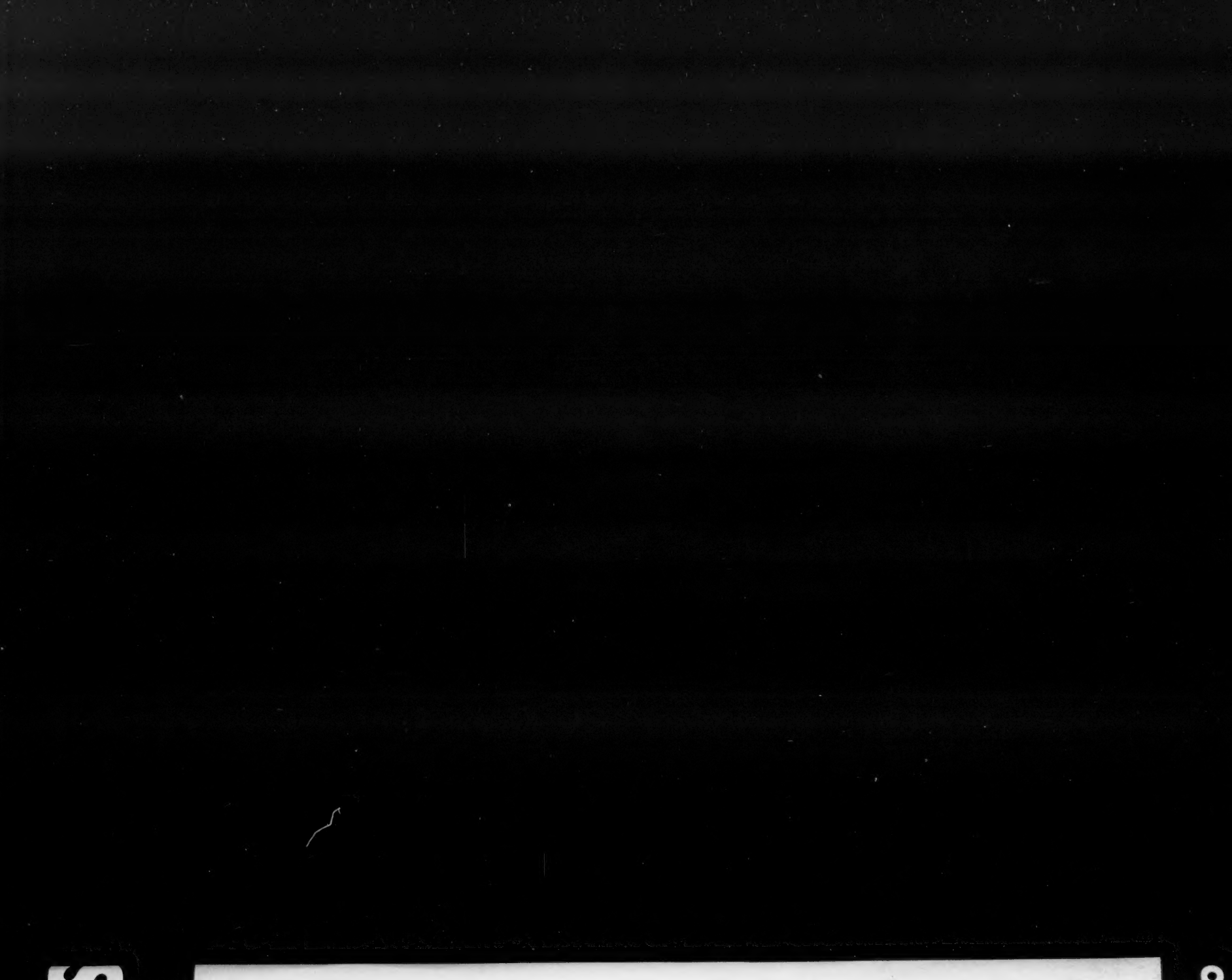
The above rotary, scale-free hardening furnace is an excellent example. This comparatively small and inexpensive installation handles miscellaneous small and medium sized products such as springs, bolts, screws, etc., at the rate of 250 lbs. per hour.

The complete unit consists of furnace, quenching equipment, automatic controls and an Elfurno generator for supplying the protective atmosphere for scale-free hardening.

With this equipment, the heat treating of miscellaneous small and medium sized parts and products is placed on a practical, continuous, uniform and economical basis. The furnace has two doors and two quench tanks. The material is loaded into heat resisting alloy trays, carried around the furnace and discharged through sealed chutes to either a water or an oil quench. The drive is so arranged that the rotation of the hearth may be in either direction, thus by using opposite doors for loading, it is possible to operate the furnace in either direction and to discharge into either the oil or the water quench.

This permits considerable flexibility as the material may be either oil or water quenched from the same equipment without moving the quench tanks or changing the quenching medium. By removing the material from the trays instead of discharging into quench tanks, this furnace can also be used for drawing, annealing or other processes.

For heat treating from 300 to 1700 lbs. per hour, we recommend the EF Continuous Chain Belt Conveyor Type Furnaces which we build in five standard sizes. These furnaces handle all kinds of products ranging in size from small springs, bolts and bearing parts up to large track links for tanks and tractors.

Send for additional information on the above and other types.

# The Electric Furnace Co., Salem, Ohio